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Evaluation of Different Marketed Brands of Losartan Potassium Tablets: A Comparative Study with Generic Shop Products

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ABSTRACT

The present study aims to compare the pharmaceutical equivalence of the same Losartan potassium tablets of different brand manufacturers that are available in the drug market. Three brands of commercial available Losartan potassium film tablets containing 25 mg of Losartan potassium were used in this study. Quality control tests were evaluated for Losartan potassium film tablets. All commercial Losartan potassium film tablets met the criteria specified by quality control test parameters. The dissolution profile was carried out using the apparatus II according to USP guidelines. All different formulations meet the acceptable limits with the official monographs for the quality control tests. The dissolution profiles showed variation between brand to brand drugs. The assay was calculated by using the absorbance 288nm. All samples attained more than 70% dissolution media within 30 minutes. The result was subjected to statistical analysis is to compare dissolution profiles of different Marketed products.

KEY WORDS: Losartan potassium, Quality control test, Dissolution.

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INTRODUCTION

Losartan potassium (Figure 1), 2-butyl-4-chloro-1-[p-(o-1H-tetrazole-5-ylphenyl)benzyl] imidazole-5-methanol mono-potassium salt[1] is a strong antihypertensive agent, non-peptide, and exerts its action by specific blockade of Angiotensin II receptors. It develops a gradual and long-lasting effect as antihypertensive, becoming a new alternative to this frequent chronic disease treatment. United States Pharmacopeia (USP) XXIV has not yet incorporated its analytical monograph method for Losartan quantification. However, several methods have been described for the determination of Losartan potassium drug substance in tablets. These methods employ techniques such as high-performance liquid chromatography (HPLC)[2,3] supercritical fluid chromatography (SFC), capillary electrophoresis (CE)[4] and high-performance thin-layer chromatography (HPTLC) but we have taken the UV method because it is easy to determine Losartan potassium drug substance and also economical. An analytical method to control the quality of a pharmaceutical form should be under systematic evaluation to verify its users about the purposes of the design. Spectra of Losartan Potassium standard were built in the range from 400 to 200 nm using 1 cm quartz cuvettes in the fast scan speed, 2.0 nm data interval and 2 nm bandwidth. The percentage of drug release (DR %) was assayed at a wavelength of 288 nm [5, 6]

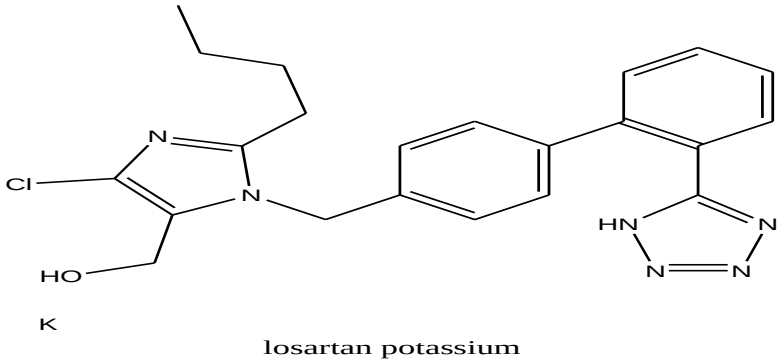

Figure-1: structure of Losartan potassium

Table No. 1: "Physical and chemical properties of the Losartan potassium"

Solubility	Water
Colour	Light yellow
Molecular weight	461g/mol
Melting point	263-265°C
pKa Value	4.9

OBJECTIVE

The objective of this work is to analyze different tablet formulations of Losartan potassium and to evaluate the amount of drug present in different drugs when compared to the label claim.

For the analysis of different brands of Losartan Potassium, we used tablets such as Losar-25(Torrent Pharma), losakind-25(Mankind Pharma) was bought from the Retail store and cost-25(Cipla LTD) was bought from the Generic store.

Table No. 2: "Details of Losartan potassium film-coated tablets (Three different products)"

S.no	Brand code	An (Ordinary Shop)	B(Generic Shop)	C(Ordinary Shop)
1	Brand Name	LOSAR-25	COSART-25	LOSAKIND-25
2	Manufacture	Torrent Pharmaceuticals Pvt, LTD.	Cipla LTD.	MANKIND PHARMA LTD.
3	Description	Each film-coated tablet contains Losartan potassium 25 mg Excipients……...…….……		
4	Colour	Titanium Dioxide I.P.	Titanium Dioxide I.P.	Titanium Dioxide I.P
5	Dosage	As prescribed by the physician		
6	Storage	Store in a dry place, protect from light		
7	Mfg.Lic.No	9FY7F010	N490665	M/734/2016
8	Mfg.Date	July 2019	Aug 2019	06/2018
9	Exp. Date	June 2022	Jul 2021	05/2021
10	Price(As Per Strip Of Tablets)	57.15/- as per 15Tab/strip	28.17/- as per 10Tab/strip	20/-as per 10Tab/strip

METHODOLOGY [7-10]

Materials

Distilled water, losartan potassium tablets standard and sample, glass rod, mortar and pestle, measuring cylinder, tissue paper, weigh balance and UV (PG- T60).

Methods and results

Wash the apparatus (beakers, glass rod, conical flask, mortar, and pestle, measuring cylinder) and rinsed with freshly prepared distilled water. Dry all the apparatus. Now weigh the tablets accurately. Crush the tablets in mortar and pestle. Transfer the 20mg of the calculated amount of drug into 100ml of volumetric flask and make up the volume with freshly prepared distilled water. Note down the absorbance of standard solution and sample solution separately at 288nm wavelength by using a UV visible spectrophotometer. Calculate the % assay with the help of formula.

Preparation of standard stock solutions [11-17]

The stock solution was prepared by accurately weighed 100 mg LOSTRAN POTASSIUM and transferred into 100 ml volumetric flask. The flask was swirled to dissolve the powdered losartan. Volume was made up to the mark with distilled water, which gave 1000 µg/ml of the drug. An aliquot from the stock solutions was appropriately diluted with water to obtain working standard solutions of 100 µg/ml of the drug. Aliquots of standard stock solution were pipette out and suitably diluted with distilled water to get the (10, 20, 30, 40, 50µg/ml) final concentration of working solutions.

Table No. 3: "Absorbance values at 288nm of LOSARTAN POTASSIUM"

S. No	Standard	Concentrations(µg/ml)	Absorbance of 288nm
1	STD 1	10	0.022
2	STD 2	20	0.045
3	STD 3	30	0.065
4	STD 4	40	0.090
5	STD 5	50	0.112

The process was repeated three times; by using the same sieves of concentration, a straight line was observed in the concentration range of 10-50 µg/ml indicating that LOSTRAN POTASSIUM obeys Beer's law. The coefficient of determination, R-value was nearer to one in all three trails.

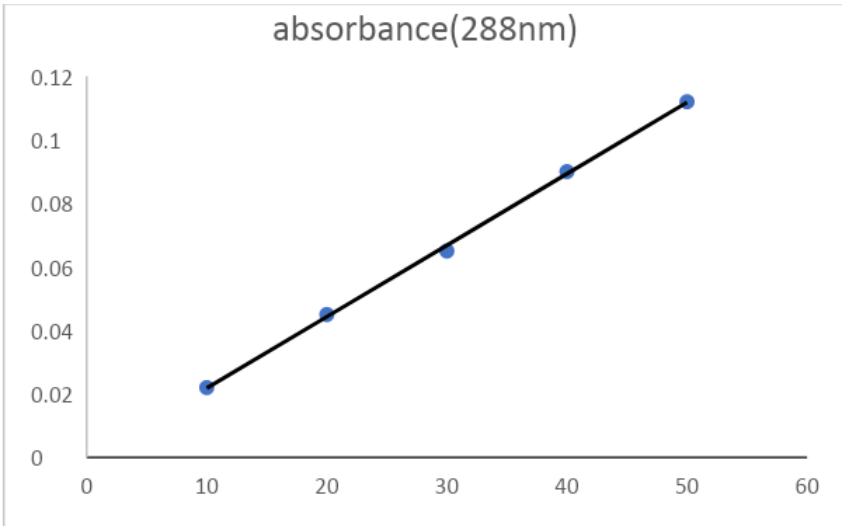

Figure-2: Absorbance VS Concentration (spectrophotometric determination for the standard)

Sample preparation of 3 different brands of Tablets Obtained from market [18-24]

For analysis of three different brand tablet formulation, weigh the three different brands of five tablets of Losartan potassium were weighed accurately and finely powdered separately. An accurately weighed portion of the powdered sample, equivalent to 20 mg of Losartan potassium was taken in a 100 ml volumetric flask containing 25 ml of water, sonicated for 3 minutes. The resultant solution was filtered through Whatman filter paper No. 41 into another 100ml volumetric flask. And the final volume of filtrate solution was made up to the mark with water to get the stock solution of 200µg/ml. This filtrate was diluted suitably with the solvent to get a solution of 20µg/ml concentration. Various (20, 40, 60, 80,100µg/ml) dilutions of the tablet solution were prepared and analyzed for five times and the concentration was calculated by using the calibration curve.

Table No. 4: "Absorbance values at 288nm of three different brands"

S.No	Standard	Concentration(µg/ml)	Absorbance of 288nm		
			Torrent Brand-A	Cipla Brand-B	Mankind Brand -C
1	STD 1	20	0.051	0.057	0.055
2	STD 2	40	0.088	0.107	0.107
3	STD 3	60	0.135	0.162	0.149
4	STD 4	80	0.173	0.219	0.199
5	STD 5	100	0.218	0.269	0.251

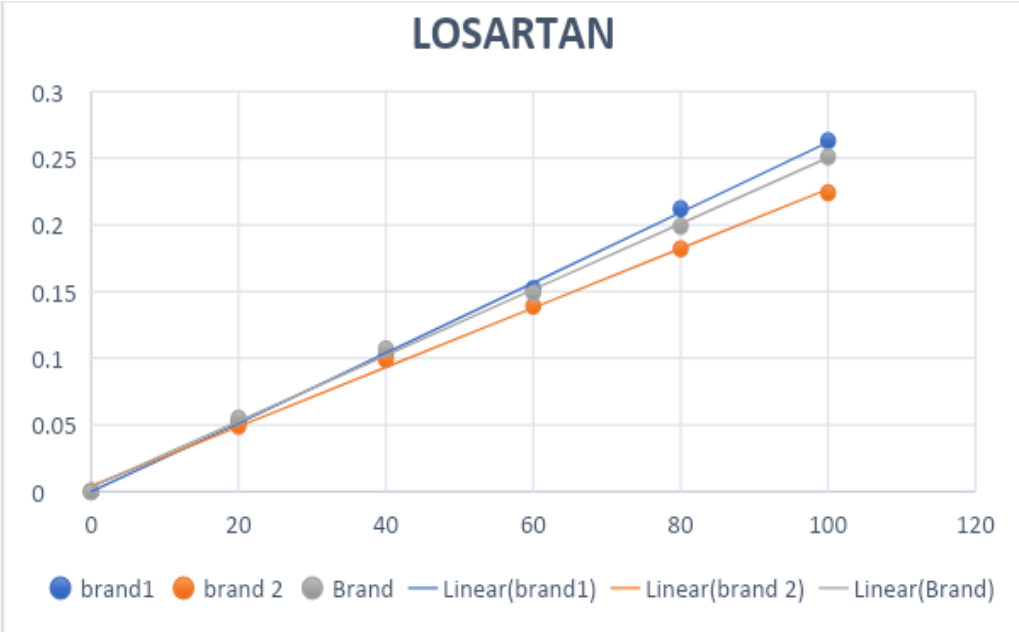

Figure-3: Spectrophotometric determination of three different brand tablets

Method and Results [25-30]

Uniformity of weight:

The test was carried out by weighing individually twenty tablets and their average weight was calculated. The percent deviation of the weight of each tablet against the average weight was calculated. The test requirements are met if not more than 5%.

%Deviation =Individual weight -Average weight/ Average weight x100

Weight variation

The average weights of tablets of three different brands of losartan potassium were found in the range of (132.5-200.5mg). All the film-coated tablets passed weight variation test as the percentage of weight variation was within USP limits of +/-7.5% of the average weight.

Content of Active Ingredient (Assay):

Five tablets were weight accurately and ground into a fine powder. Powder equivalent to 20mg mg of Losartan potassium was weighed accurately and dissolved in 100ml of water. 1ml of the sample was taken dilution were made as 20µg/ml concentration. Absorbance was measured at 288nm and % purity was determined.

Content of active ingredient (assay) = practical value /theoretical value ×100

Thickness:

The thickness of the tablets was determined by using Digital Vernier calipers. Five tablets were used, and the average values were calculated.

Hardness:

Hardness can be defined as the strength of the tablet to withstand the pressure Uniformity of weight applied. The tablet to be tested was held between a fixed and a moving jaw of Monsanto Hardness Tester. The average values were calculated and expressed in kg/cm2.

Friability:

Friability test can be performed to evaluate the ability of the tablets to withstand abrasion in packing, handling and transporting. The Granulator consists of a plastic chamber divided into two parts and revolves at 25 rpm. A fixed number of tablets are weighed, placed in the tumbling chamber and rotated for four minutes of 100 revolutions. The acceptable limits of weight loss should not be more than 1%. The percentage weight loss (friability) was calculated using the formula:

% Friability = (Loss in weight / Initial weight) × 10

Dissolution Study:

Dissolution tests were performed using the method of USP Apparatus 2 (Paddle method) at a speed of 50 rpm at 37+/-0.5^{0}c. The dissolution media which were 900ml of distilled water were used. The sample was collected within time intervals of 5, 10, 15, 20, 30, 45 and 60 min 5ml of the sample withdrawn was filtered through Whatman filter paper. Appropriate dilutions were made to get the absorbance in the linearity range of medium. The samples were collected for every 5min and are analyzed the absorbance by UV Spectrophotometer at the wavelength of 288nm and calculated from the calibration curve equation and the cumulative percent of drug release was calculated.

Preparation of 6.8 Phosphate buffer:

Take 250ml of 0.2M KH_2PO_4 (27.22gm/lit) and 112ml of 0.2M NaOH (8gm/lit) dissolve in a sufficient quantity of distilled water and makeup to 1000ml.

- **Apparatus:** USP apparatus type -II (basket) (Electro lab, India)
- **Temperature:** 37°C ± 0.5°C
- **RPM:** 50
- **Dissolution medium:** water,6.8 phosphate buffer

- **Volume of medium:** 900 ml.
- **Sampling interval:** 5, 10, 15, 20, 30, 45 and 60 min.

Evaluation of Quality Control Tests and Its Results

Table No. 5: "Quality control tests"

Formulation	Weight variation (mg)	Hardness (kg/cm^2)	Friability (%)	Drug content(mg/tablets)
Brand-A	102±0.93	5.8±0.2	0.98	98.11±0.4
Brand-B	107±0.98	6.1±0.2	0.98	99.45±0.2
Brand-C	138±0.72	6.8±0.2	0.98	100.75±0.2

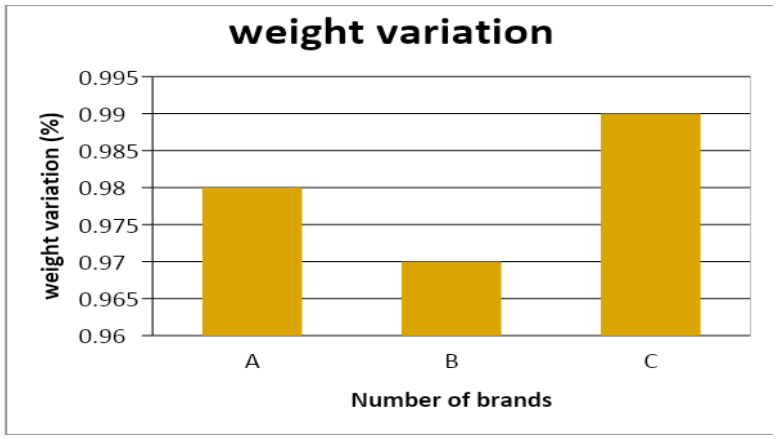

Figure-4: Weight variation test of different tablet

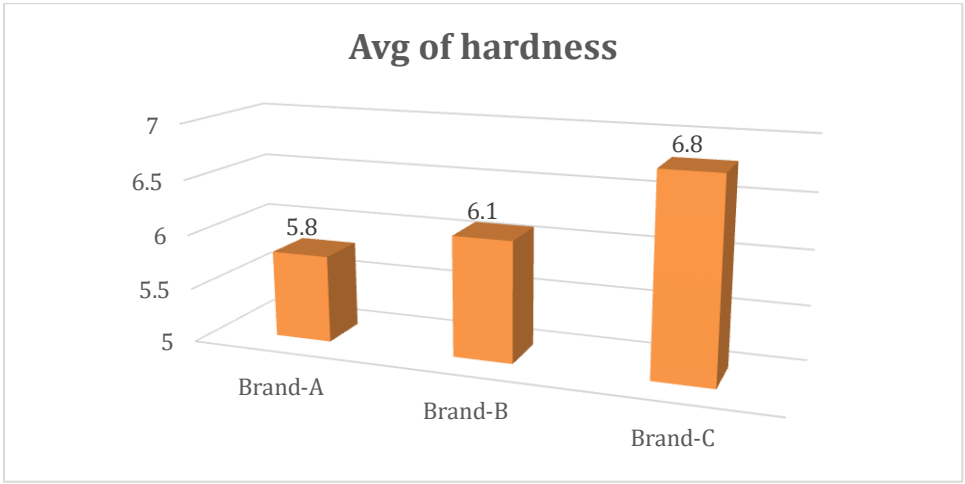

Figure-5: Hardness test of different brand tablets

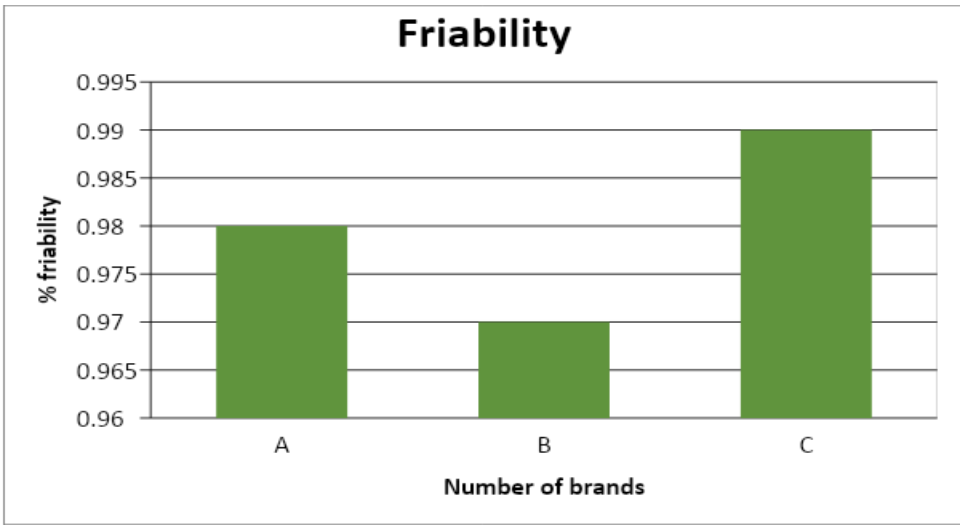

Figure-6: Friability test of different brand tablets

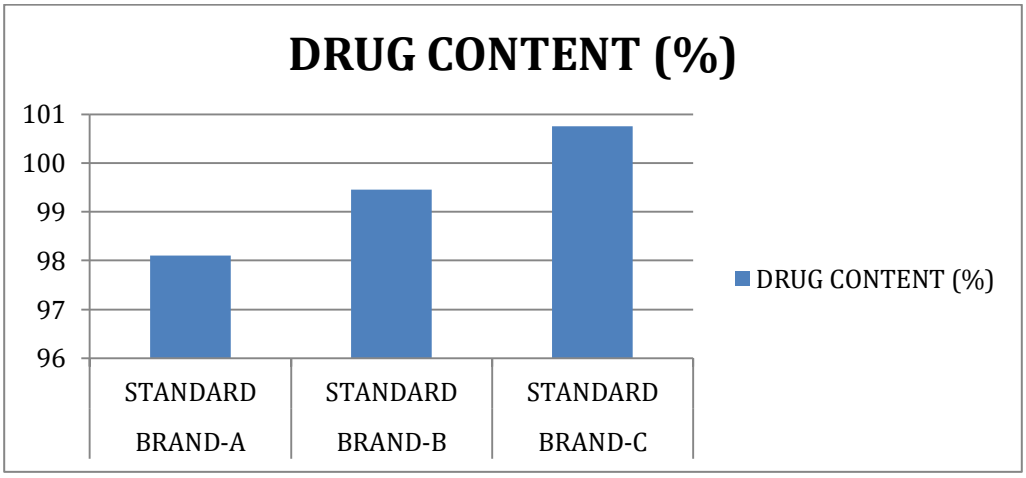

Figure-7: Average drug release of three different brand tablets

Table No. 6: "Dissolution study in water and comparison with the marketed product"

	% Drug Release		
Time	**Brand-A**	**Brand-B**	**Brand-C**
0	0	0	0
5	44.37±0.165	32.58±0.19	32.58±0.24
15	58.55±0.22	47.72±0.18	47.21±0.21
30	72.65±0.18	69.97±0.26	71.44±0.23
45	82.22±0.23	77.11±0.20	82.81±0.21
60	100.63±0.21	97.57±0.18	100.23±0.22

Table No. 7: "Dissolution study in 6.8 phosphate buffer and comparison with the marketed product"

	% Drug Release		
Time	**Brand-A**	**Brand-B**	**Brand-C**
0	0	0	0
5	36.2±0.24	39.42±0.22	30.23±0.24
15	59.07±0.18	64.10±0.21	66.05±0.20
30	68.93±0.26	74.69±0.21	77.02±0.20
45	77.51±0.22	84.67±0.24	87.69±0.23
60	84.33±0.18	92.85±0.17	93.69±0.19

CONCLUSION

Validated UV-spectrophotometer methods for the determination of Losartan potassium in pharmaceutical dosage preparations (tablets) by the external standard method at 288 nm were applied.

UV method is an alternative method to determine the amount of losartan potassium in pharmaceutical tablet dosage forms. It has some advantages over other methods such as low-cost, simplicity and fastness. The results obtained from this investigation of three different brands of losartan potassium film tablets in the local market indicated that all the tablets met the criteria specified by quality control test parameters.

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