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Original Article

COMPARISON OF THE QUALITY AND IN VITRO DISSOLUTION PROFILES OF COMMERCIAL LOSARTAN POTASSIUM FILM TABLETS

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Abstract

The aim of the present study is to compare and evaluate in vitro dissolution profiles and some quality control test parameters of commercial products containing 50 mg losartan potassium that are available on drug market. Furthermore, difference (f_1) and similarity (f_2) factors were calculated from the dissolution data for these tablets so as to evaluate the differences and similarities of their dissolution profiles. Four brands of commercial conventional losartan potassium film tablets containing 50 mg of losartan potassium were used and coded as LP1(original, innovative and reference product), LP2, LP3 and LP4. Some quality control tests such as diameter/thickness, crushing strength, uniformity of mass and drug assay were evaluated for losartan potassium film tablets. All commercial losartan film tablets met the criteria specified by quality control test parameters. In vitro dissolution profiles of LP2 and LP4 were similar to the in vitro dissolution profile of the reference, whereas f_2 values for LP3 was found less than 50 and therefore release profile for LP3 was different than the reference profile. Dissolution data of commercial conventional losartan potassium film tablets were applied to zero order, first order, Higuchi, Hixson-Crowell and RRSBW (Weibull) kinetics. The evaluation of determination coefficient(r^2) and residual mean square (RMS) indicated that the drug release from all commercial losartan potassium film tablets for distilled water and pH 6.8 phosphate buffer solution media seems to comply with RRSBW kinetic model.

Key Words: *Losartan potassium, dissolution, similarity factor*

Ticari Losartan Potasyum Film Tabletlerinin Kalitesinin ve İn Vitro Çözünme Hızı Profillerinin Karşılaştırılması

Bu çalışmanın amacı ilaç piyasasında bulunan 50 mg losartan potasyum içeren ticari müstahzarların in vitro çözünme hızı profillerinin ve bazı kalite kontrol test parametrelerinin karşılaştırılması ve değerlendirilmesidir. Ayrıca preparatların çözünme hızı profillerinin mukayese edilmesinde benzerlik ve farklılıklarının değerlendirilmesi için, bu ürünlerin benzerlik (f_2) ve fark (f_1) faktörleri hesaplanmıştır. LP1 (referans), LP2, LP3, LP4 kodlarının verildiği 50 mg losartan potasyum içeren dört ticari piyasa preparatı kullanılmıştır. Losartan potasyum film tabletlerinde çap/kalınlık, kırılmaya karşı direnç, ağırlık tekdüzeliği ve etkin madde miktar tayini gibi bazı kalite kontrol testleri değerlendirilmiştir. Bütün ticari losartan potasyum film tabletleri kalite kontrol test parametrelerinde belirlenmiş kriterleri karşılamaktadır. LP2 ve LP4 kodlu ürünlerin in vitro çözünme hızı profilleri referans ürünün in vitro çözünme hızı profili ile benzerlik gösterirken, LP3 kodlu ürünün in vitro çözünme hızı profili referans üründen farklılık göstermiş ve f_2 değeri 50 değerinin altında bulunmuştur. Ticari konvansiyonel losartan potasyum film tabletlerin çözünme hızı verileri 0. derece, 1. derece, Higuchi, Hixson-Crowell ve RRSBW kinetiklerine uygulanmıştır. Determinasyon katsayısı (r^2) ve artık kareler ortalaması (RMS) değerlendirildiğinde, hem distile su hem de pH 6.8 tampon çözeltisinde bütün losartan potasyum tabletlerinden etkin madde salımı RRSBW kinetiğine uyum göstermiştir.

Anahtar Kelimeler:*Losartan potasyum, çözünme hızı, benzerlik faktörü*

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INTRODUCTION

Hypertension is one of the best established independent risk factors for cardiovascular disease and stroke, and is common in all populations and all ethnic groups. Hypertension remains a major clinical challenge world-wide, because of both the direct consequences of high blood pressure (cerebral haemorrhage, hypertensive heart failure, progressive renal failure) and the secondary consequence of accelerated atherosclerosis and its complications in the aorta, coronary and cerebral arteries. In developed countries, heart disease and stroke are, respectively, the first- and third- ranked causes of morbidity and mortality (1).

Losartan potassium, an angiotensin II receptor antagonist is the first of a new class of agents to be introduced for the treatment of hypertension (1). The chemical structure of losartan potassium is shown in Figure 1.

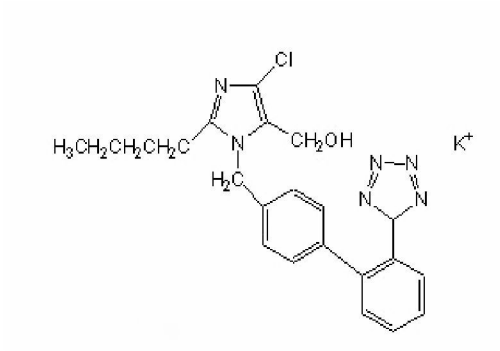

Figure 1. Chemical structure of losartan potassium

Losartan potassium, is a white to off-white free-flowing crystalline powder with a molecular weight of 461.01 and pK_a value is 4.1 and octanol/water partition coefficent is 15 (2). It is freely soluble in water, soluble in alcohols, and slightly soluble in common organic solvents (3).

Peak concentrations of losartan occurred about 1 h. after the oral administration of 50 mg losartan potassium tablets to healthy subjects (1). Losartan is well absorbed and undergoes substantial first-pass metabolism, the systemic bioavailability of losartan is approximately 33 % (range 19-62 %). About 14% of an orally-administered dose of losartan is converted to the active metabolite (3).

Drug absorption from a solid dosage form after oral administration depends on the release of the drug substance from the drug product, the dissolution or solubilization of the drug under physiological conditions and the permeability across the gastrointestinal tract. Because of the critical nature of the first two of these steps, in vitro dissolution may be relevant to the prediction of in vivo performance (4).

The aim of the present study is to compare in vitro dissolution profiles and some physical quality control parameters of losartan potassium film tablets containing 50 mg losartan potassium that are available on the drug market. Some quality control tests such as weight variation, diameter and thickness, crushing strength and drug amount were administered. Furthermore, difference (f_1) and similarity (f_2) factors were applied to these tablets so as to evaluate the differences and similarities of their dissolution profiles.

United States Pharmacopoeia (USP) 28, has not included an analytical monograph for UV spectrophotometrical method for losartan potassium quantification yet. For this reason, we proposed and validated a new procedure based on UV spectrophotometry to determine losartan potassium drug substance which is a single active principle in tablets.

The FDA guidance recommends at least three dissolution media (pH 1.2, pH 4.5, pH 6.8 buffer) if USP drug product dissolution test is not available (5). Also FDA recommends that

deaerated water can be used as dissolution medium for losartan potassium tablets (6). As losartan potassium did not dissolve in 0.1 N hydrochloride acid and pH 4.5 acetate and phosphate buffer solutions, two different dissolution media: deaerated distilled water and simulated intestinal fluid pH 6.8 phosphate buffer solutions were chosen.

MATERIALS AND METHOD

Materials

Losartan potassium was a kind gift of Eczacıbaşı Drug Company, Turkey. In our studies, four brands of commercial conventional losartan potassium film tablets containing 50 mg of losartan potassium were used and coded as LP1 which is reference, innovative and original product, LP2, LP3 and LP4. All other chemicals were analytical grade. Also deaerated distilled water was used in this study.

Determination of standard calibration curves and analytical method for the assay of losartan potassium

In order to determine the standard calibration curve of losartan potassium in distilled water, a stock solution of 50 mg/100 ml in distilled water was prepared. Then dilutions were made to prepare a series of solutions containing losartan potassium in different concentrations. In these solutions absorbance values at 254 nm were determined UV spectrophotometrically and by plotting the concentration values (x) versus absorbance values (y) a calibration curve of losartan potassium in distilled water was obtained. Additionally, the same procedure was repeated for pH 6.8 phosphate buffer solution and calibration curve for this medium was also obtained. Related statistical values were calculated by the ANOVA test (GraphPad InStat).

Furthermore, UV spectrophotometrical method for the assay of losartan potassium was validated and validation parameters of the analytical method were determined. Related statistical values were calculated by the ANOVA test (GraphPad InStat, SPSS 9.0 for Windows).

Determination of LOD and LOQ

The limit of detection (LOD) and the limit of quantitation (LOQ) were determined by using the following equations (7,8);

$LOD = 3.3\ SD/m$ (Equation 1)
$LOQ = 10\ SD/m$ (Equation 2)

where SD is the standard deviation of the absorbance values determined at 254 nm, reading six times (n=6) of the smallest concentration, m is the slope of the calibration curve.
For each different media which were distilled water and pH 6.8 phosphate buffer solution, LOQ and LOD were determined.

Repeatability

For two different media; distilled water and pH 6.8 phosphate buffer solution, losartan potassium solutions were prepared and analyzed (n=6) and the results were evaluated regarding within day (intra-day) and between day (inter-day) precision. A t-test was applied to check for a significant difference among the means. No significant difference was found.

Intermediate precision

For two different media; distilled water and pH 6.8 phosphate buffer solution, six losartan potassium solutions were prepared and analyzed by different analysts. A t-test was conducted to check for a significant difference among the means. No significant difference was found.

Determination of accuracy and recovery

For two different media; distilled water and pH 6.8 phosphate buffer solution, accuracy of the method was tested at three concentrations in the linearity range with reading six times and with three replicates.

Determination of linearity and range

Linearity of UV spectrophotometrical method of losartan potassium concentration was established by preparing one series (n=7) of losartan potassium solutions ranging from 0.004 to 0.028 mg/ml.

Determination of drug amount

At the first step, ten losartan potassium tablets from each brand (containing 50 mg losartan potassium) were weighed and finely powdered in a mortar (İldam Kimya, Turkey). The average weight of a tablet was calculated. A sufficient quantity equivalent to the average weight of a tablet content was accurately weighed from the tablet powder and water was added to dissolve the active material and made up to the volume of 100 ml in a volumetric flask (İldam Kimya, Turkey). It was sonicated for 10 minutes and was filtered. Then 1 ml of this solution was taken and put into another volumetric flask. Then it was completed to 25 ml with distilled water and in this solution absorbance value at 254 nm was determined UV spectrophotometrically and with the aid of the calibration equation drug amount in the sample was calculated (9-11).

Measurement of the diameter and thickness

The diameter and thickness of losartan potassium film tablets (n=10) from each brand were measured with a micrometer (USSR) (12).

Weight Variation

Each film tablet (n=20) belonging to each brand was weighed with an electronic balance (Sartorius BL 210 S, Germany) [12,13].

Crushing strength

This test was applied with a hardness tester on 10 film tablets for each brand (Strong-Cobb T 100 tablet hardness tester) (12,13).

In vitro release studies

Dissolution tests were performed using the method of USP Apparatus 2 (paddle method) (Aymes D96D, Turkey) at a speed of 50 rpm at 37±0.5°C [4,13]. Two different dissolution media which were 900 ml of distilled water (6) and simulated intestinal fluid pH 6.8 phosphate buffer solution were used. The samples were withdrawn at definite time intervals for one hour and were assayed spectrophotometrically at 254 nm[10] (Shimadzu 1202 UV-VIS spectrophotometer, Japan). The percentage of cumulative losartan potassium amounts released from the film tablets were calculated and kinetically evaluated by using SPSS 9.0 for Windows.

Comparison of the dissolution profiles

In this study, as model-independent approaches, two fit factors that compare the dissolution profiles of a pair of drug products were applied to the dissolution data. These fit factors directly compare the difference between percent drug dissolved per unit time for a test and a reference product. The fit factors are denoted difference (f_1) and similarity (f_2) factors and are defined by equations 3 and 4 (12,14):

$$f_1 = \left\{ \frac{\sum_{t=1}^{n} |R_t - T_t|}{\sum_{t=1}^{n} R_t} \right\} X100 \qquad \text{(Equation 3)}$$

$$f_2 = 50 \log \left\{ \left(1 + \frac{1}{n} \sum_{i=1}^{n} (R_t - T_t)^2 \right)^{-0.5} X100 \right\} \qquad \text{(Equation 4)}$$

where n is the number of dissolution sample times and R_t and T_t are the individual or mean percents dissolved at each time point, t, for the reference and test products respectively.

RESULTS AND DISCUSSION

Determination of calibration curves for losartan potassium

The calibration curves of losartan potassium were obtained using the analytical method for the assay of losartan potassium and they were shown in Figures 2 and 3. Statistical values for calibration curves of losartan potassium assay by UV spectrophotometric method were given in Table 1.

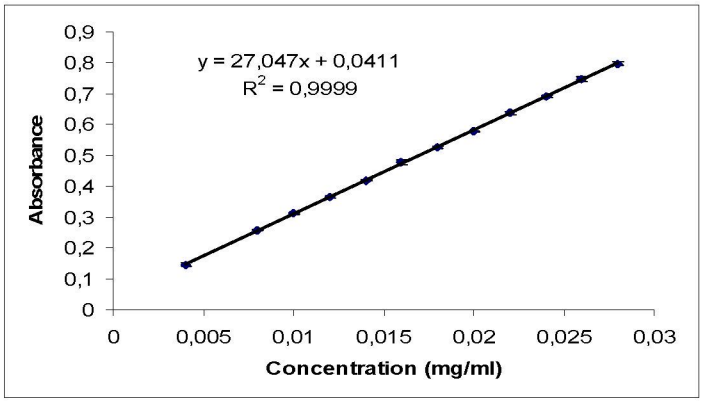

Figure 2. Calibration curve for losartan potassium in distilled water

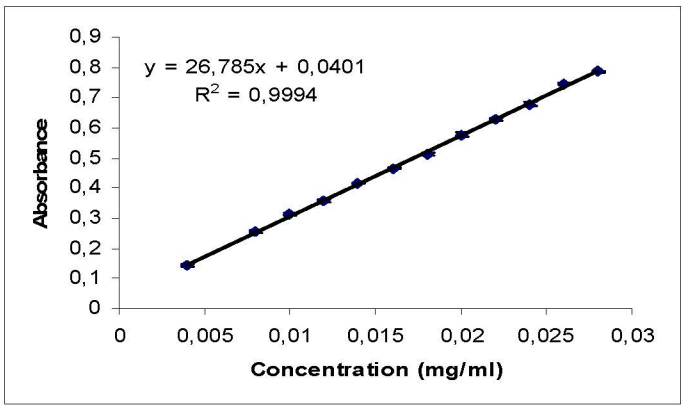

Figure 3. Calibration curve for losartan potassium in pH 6.8 phosphate buffer solution

Table 1. Statistical values for calibration curves of losartan potassium

Parameter	Results for distilled water	Results for pH 6.8 phosphate buffer solution
•Slope (m)	27.047	26.785
•RSD of slope	0.4690	0.2421
•Standard error of slope	0.09968	0.2050
•Confidence limits of slope (%95)	26.824-27.269	26.329-27.242
•Intercept (n)	0.0411	0.0401
•RSD of intercept	3.2329	2.1856
•Standard error of intercept	0.001825	0.003752
•Confidence limits of intercept (%95)	0.03707-0.04520	0.03175-0.04847
•Determination coefficent (r^2)	0.9999	0.9994
•Residual Mean Square (RMS)	$6.158x10^{-6}$	$2.605x10^{-5}$
•Standard deviation of residuals from line (Sy.x)	0.002481	0.005103

Analytical method validation study

The objective of validation of an analytical procedure is to demonstrate that it is suitable for its intended purpose[8]. The analytical method validation parameters which were linearity and range, accuracy and recovery, repeatability, intermediate precision, LOD and LOQ were determined.

For each different media; distilled water and pH 6.8 phosphate buffer solution, LOD and LOQ were calculated by multiplying (standard deviation of the absorbance values of the smallest concentration, SD / slope of the calibration equation) with 3.3. and 10, respectively. For distilled water medium, they were calculated to be $4.95x10^{-6}$ mg/ml for LOD and $1.50x10^{-5}$ mg/ml for LOQ. For pH 6.8 phosphate buffer solution medium, they were calculated to be $4.65x10^{-6}$ mg/ml for LOD and $1.41x10^{-5}$ mg/ml for LOQ.

Repeatability and intermediate precision test results were given in Tables 2, 3. Accuracy and recovery study results of losartan potassium were given in Table 4, 5. The data shown in Tables 2-5 indicated good accuracy and precision of the proposed procedure.

Table 2. Repeatability test results of 0.0180 mg/ml losartan potassium solution

Statistical parameters	Water		pH 6.8	
	First day	Second day	First day	Second day
M	$1.797x10^{-2}$	$1.790x10^{-2}$	$1.783x10^{-2}$	$1.781x10^{-2}$
SD	$4.914x10^{-5}$	$7.270x10^{-5}$	$7.341x10^{-5}$	$8.649x10^{-5}$
RSD %	0.2735	0.4061	0.4118	0.4856

M: Mean Value
SD: Standart Deviation
RSD: Relative Standard Deviation

Table 3. Intermediate precision test results of 0.0180 mg/ml losartan potassium solution

Statistical parameters	Water		pH 6.8	
	First analyst	Second analyst	First analyst	Second analyst
M	$1.791x10^{-2}$	$1.805x10^{-2}$	$1.788x10^{-2}$	$1.797x10^{-2}$
SD	$1.418x10^{-4}$	$1.523x10^{-4}$	$1.293x10^{-4}$	$1.020x10^{-4}$
RSD %	0.7915	0.8439	0.7233	0.5678

M: Mean Value
SD: Standard Deviation
RSD: Relative Standard Deviation

Table 4. Accuracy and recovery test results of losartan potassium in water

Theoretical value (mg/ml)	Practical value* (mg/ml)	Recovery (%)	RSD (%)
0.004	$0.00399\pm7.39x10^{-5}$	99.73	1.854
0.016	$0.01598\pm9.30x10^{-5}$	99.88	0.582
0.028	$0.02806\pm7.39x10^{-5}$	100.21	0.264

RSD: Relative Standard Deviation
*Mean±standard deviation of three determinations

Table 5. Accuracy and recovery test results of losartan potassium in pH 6.8 phosphate buffer solution

Added (mg/ml)	Found* (mg/ml)	Recovery (%)	RSD (%)
0.004	$0.00388\pm3.73x10^{-5}$	96.98	0.962
0.016	$0.01584\pm9.39x10^{-5}$	98.99	0.593
0.028	$0,02782\pm1.31x10^{-4}$	99.37	0.471

RSD: Relative Standard Deviation
* Mean±standard deviation of three determinations

Linearity and range study results of losartan potassium were evaulated and calibration curves for linearity and range were given in Figures 4, 5. The method was linear in the range of 0.004-0.028 mg/ml. Statistical values for the linearity and range tests of losartan potassium were given in Table 6.

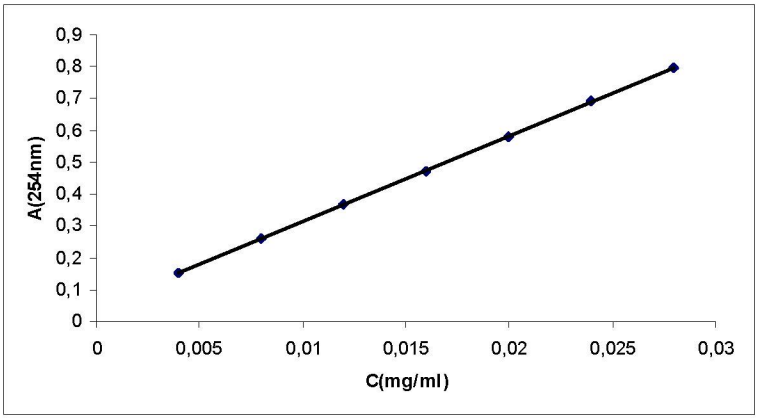

Figure 4. Calibration curve of linearity and range for losartan potassium in distilled water

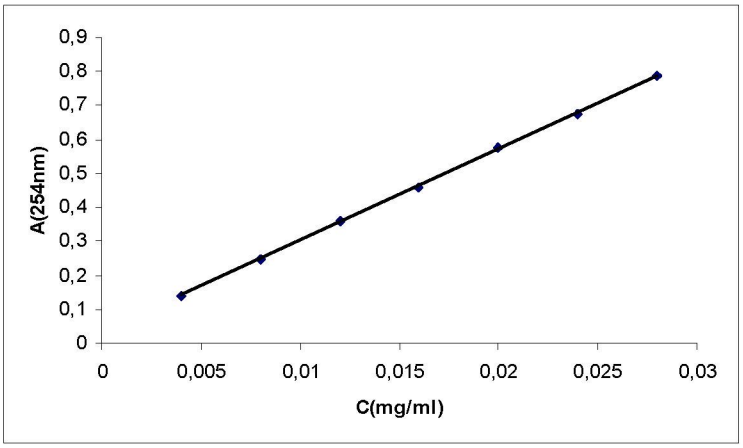

Figure 5. Calibration curve of linearity and range for losartan potassium in pH 6.8 phosphate buffer solution

Table 6. Statistical parameters for the linearity and range tests of losartan potassium

Parameter	Results for distilled water	Results for pH 6.8 phosphate buffer solution
Slope (m)	26.875	26.893
Standard error of slope	0.1579	0.1966
Confidence limits of slope (%95)	26.469-27.281	26.387-27.398
Intercept (n)	0.0451	0.0343
Standard error of intercept	0.002825	0.003517
Confidence limits of intercept (%95)	0.03788-0.05241	0.02524-0.04333
Determination coefficent (r^2)	0.9998	0.9997
Residual Mean Square (RMS)	$1.117x10^{-5}$	$1.731x10^{-5}$
Standard deviation of residuals from line (Sy.x)	0.003342	0.004161

Quality control study

Some quality control tests such as diameter/thickness, crushing strength, weight variation and determination of drug amount were evaluated for losartan potassium film tablets (Table 7). All losartan film tablets met the criteria specified by quality control test parameters.

Table 7. Some physical parameters of losartan potassium tablets

Tablet Code	Weight (g) (M±SD)	Diameter (mm) (M±SD)	Thickness (mm) (M±SD)	Crushing strength (s.c.u.*) (M±SD)	Drug Amount % (M±SD)
LP1	0.1553±0.0019	5.13±0.011	3.01±0.007	8.50±1.15	100.24±0.193
LP2	0.1576±0.0029	5.12±0.006	3.16±0.011	8.20±1.03	101.59±0.141
LP3	0.1552±0.0020	5.16±0.006	3.15±0.032	9.25±1,21	99.19±0.107
LP4	0.1573±0.0023	8.14±0.016	3.19±0.050	8.55±1.12	103.51±0.185

*(1 s.c.u. = 0.643 kg)
M: Mean Value
SD: Standard Deviation

In vitro study

Difference and similarity tests were applied to the dissolution data. The difference (f_1) factor is proportional to the average difference between the two profiles, whereas similarity (f_2) factor is inversely proportional to the average squared difference between the two profiles with emphasis on the larger difference among all the time points [12,14]. The use of these factors was also recommended for dissolution profile comparison in the FDA guide for industry. For curves to be considered similar f_1 values should be close to 0, and f_2 values should be close to 100. Generally, f_1 values up to 15 (0-15) and f_2 values greater than 50 (50-100) are reaching to the similar values or equivalence of the two curves and thus, performance of the test and reference products (4). The similarity factor, f_2 is more sensitive for dissolution profile dissimilarity than the difference factor, f_1 (14).

The dissolution profiles of LP1 (reference product), LP2, LP3 and LP4 in distilled water and phosphate buffer solution (pH 6.8) were given in Figures 4 and 5 respectively.

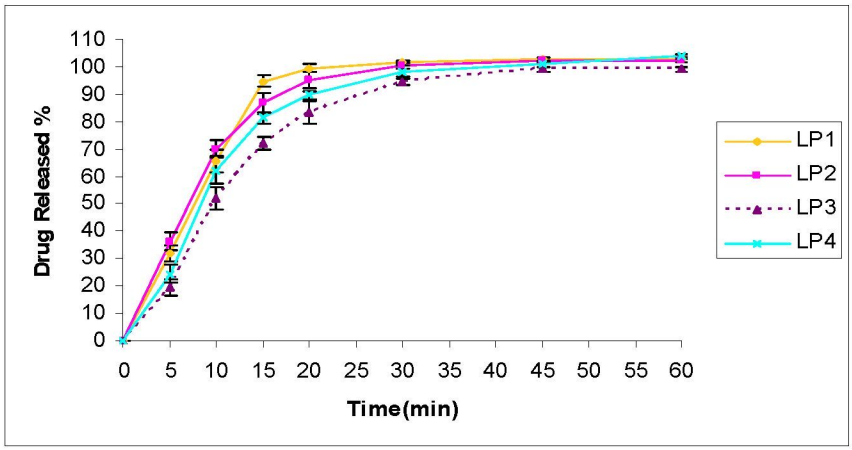

Figure 6. Dissolution profiles of conventional losartan potassium film tablets in distilled water (M±SD, n=4).

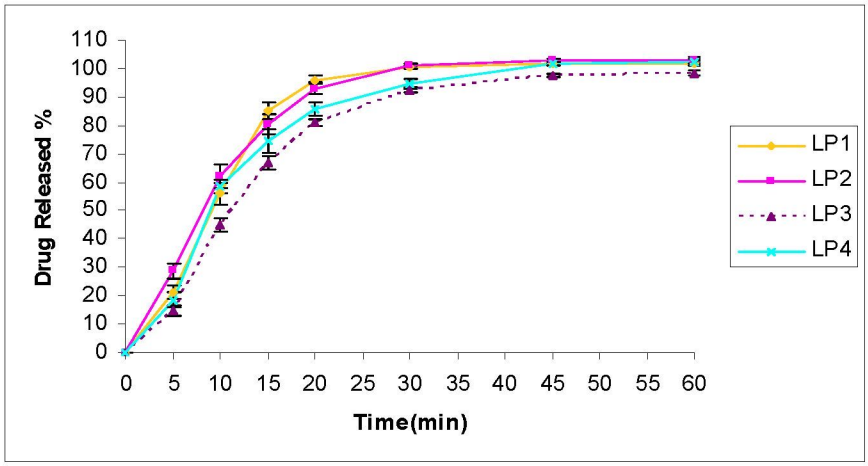

Figure 7. Dissolution profiles of conventional losartan potassium film tablets in pH 6.8 phosphate buffer solution (M±SD, n=4).

In FDA guide, it is told that immediate release (IR) product is considered rapidly dissolving (IR) when no less than 85% of labelled amount of the drug substance dissolves in 30 minutes in pH 6.8 phosphate buffer solution and water medium (5). As it can be seen in Figures 6 and 7, all conventional losartan potassium film tablets released the active drug in the accepted limits and complied to FDA guide criteria.

The f_2 factor with the values of 68.11 and 67.96 (Table 8) for LP2 and with the values of 56.85 and 60.13 (Table 8) for LP4 indicated that the release profiles of LP2 and LP4 are similar to the release profile of the reference, whereas f_2 values for LP3 was found less than 50 (Table 8) and therefore release profiles for LP3 were different than the reference profile.

This study revealed that when the in vitro dissolution profiles are compared with the reference product, two products (LP2 and LP4) can be accepted similar according to similarity (f_2) and difference (f_1) factors.

Table 8. Difference (f_1) and similarity (f_2) factors calculated between reference (LP1) and test products (LP2, LP3, LP4) for different media

	Water		pH 6.8	
	f_1 value	f_2 value	f_1 value	f_2 value
LP2	3.86	68.11	4.15	67.96
LP3	13.26	44.12	11.87	48.15
LP4	6.81	56.85	5.82	60.13

Table 9. Kinetic results and fitting criteria of losartan potassium film tablets dissolved in distilled water

Kinetic models		LP1	LP2	LP3	LP4
Zero order	r^2	0.728	0.787	0.661	0.671
	k_0	2.659	2.394	1.206	1.622
	SE	0.938	0.719	0.386	0.568
	RMS	325.263	191.174	355.496	345.248
	F	8.040	11.094	9.764	8.155
First order	r^2	0.657	0.693	0.507	0.535
	k_1	0.04157	0.03610	0.02102	0.02698
	SE	0.017	0.014	0.009	0.013
	RMS	0.111	0.07130	0.205	0.170
	F	5.745	6.763	5.134	4.596
Higuchi	r^2	0.836	0.886	0.800	0.804
	k	22.158	19.758	13.510	16.146
	SE	5.671	4.097	3.023	3.981
	RMS	196.593	102.624	210.135	205.218
	F	15.266	23.254	19.978	16.450
Hixson-Crowell	r^2	0.683	0.725	0.560	0.580
	k_4	0.05475	0.04825	0.02643	0.03460
	SE	0.022	0.017	0.010	0.015
	RMS	0.172	0.109	0.262	0.232
	F	6.449	7.899	6.366	5.523
RRSBW	r^2	0.984	1.000	0.972	0.991
	β	1.937	1.366	1.268	1.473
	SE	0.173	0.022	0.096	0.082
	RMS	0.006101	0.00009541	0.007864	0.002363
	F	125.783	4001.374	174.102	325.657
	τ_d	8.65	8.90	13.87	11.12

RMS:Residual mean square
k: Rate constant of the investigated kinetic
r^2: Determination coefficent
SE: Standard error
β: Shape factor
F: Significance test
τ_d: Time needed to be released 63.2% of drug

Determination of kinetic model

Dissolution data of conventional losartan potassium film tablets were applied to zero order, first order, Higuchi, Hixson-Crowell and RRSBW (Weibull) kinetics. Kinetic results and fitting criteria were given in Tables 9, 10. The evaluation of the kinetic results indicated that all losartan potassium film tablets for distilled water and pH 6.8 phosphate buffer solution media seem to comply with Weibull kinetic model. The slope of the line is found to be bigger than 1 ($\beta>1$), this means a slow drug release occurs at the beginning which is followed by a fast plateu value.

Table 10. Kinetic results and fitting criteria of losartan potassium film tablets dissolved in pH 6.8 phosphate buffer solution

Kinetic models		LP1	LP2	LP3	LP4
Zero order	r^2	0.795	0.841	0.688	0.725
	k_0	3.075	2.744	1.298	1.771
	SE	0.901	0.688	0.391	0.546
	RMS	300.360	175.081	364.520	318.924
	F	11.648	15.912	11.034	10.531
First order	r^2	0.682	0.725	0.516	0.544
	k_1	0.05571	0.04484	0.02453	0.03198
	SE	0.022	0.016	0.011	0.015
	RMS	0.179	0.09384	0.270	0.229
	F	6.430	7.927	5.327	4.779
Higuchi	r^2	0.890	0.926	0.822	0.848
	k	25.308	22.399	14.456	17.418
	SE	5.140	3.648	3.004	3.692
	RMS	161.488	81.344	207.600	176.526
	F	24.245	37.705	23.153	22.253
Hixson-Crowell	r^2	0.723	0.766	0.577	0.604
	k_4	0.06924	0.05810	0.02984	0.03964
	SE	0.025	0.019	0.011	0.016
	RMS	0.227	0.127	0.311	0.276
	F	7.827	9.829	6.819	6.104
RRSBW	r^2	0.999	0.999	0.961	0.968
	β	1.887	1.468	1.296	1.466
	SE	0.043	0.038	0.117	0.154
	RMS	0.0003767	0.0002899	0.01172	0.008380
	F	1933.313	1519.818	122.073	90.941
	τ_d	10.81	10.38	16.07	12.92

RMS:Residual mean square
k: Rate constant of the investigated kinetic
r^2 : Determination coefficent
SE: Standard error
β: Shape factor
F: Significance test
τ_d: Time needed to be released 63.2% of drug

CONCLUSION

The developed method is an alternative method to determine the amount of losartan potassium in pharmaceutical solid dosage forms, tablets. It has some advantages over other methods, such as low-cost, simplicity and fastness. The results obtained from this investigation of four different brands of conventional losartan potassium film tablets marketed in Turkey indicated that all the tablets met the criteria specified by quality control test parameters. However according to the dissolution rate results for conventional losartan potassium film tablets belonging to four different brands, the drug release from the product coded as LP3 was lower than the reference (original, innovative) product.

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