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RESEARCH PUBLICATIONS 2017

S. No	Faculty name	Title of the paper	Name of the journal	It is listed in UGC SCOPUS ,WEB Of Science	Link to abstract	Article count year wise
1	Devala Rao G	Rapid and Economical Quantitative Determination of Several Antihypertensive Agents in Presence of Hydrochlorothiazide by Isocratic Reversed-Phase High-Performance Liquid Chromatography in their Pharmaceutical Preparations	Asian Journal of Pharmaceutical and Clinical Research	Scopus preview - Scopus - Asian Journal of Pharmaceutical and Clinical Research	10.22159/ajpcr.2017.v10i12.18714	1
2	Jyothirmayee Devineni, Buchi N.Nalluri	Microneedle-Assisted Transdermal Delivery of Zolmitriptan: Effect of Microneedle Geometry, In Vitro Permeation Experiments, Scaling Analyses and Numerical Simulations micr	Drug Development and Industrial Pharmacy	Scopus preview - Scopus - Drug Development and Industrial Pharmacy	DOI: 10.1080/03639045.2017.1313862	2
3	Jyothirmayee Devineni, Buchi N.Nalluri	Effect of Microneedles on Transdermal Permeation Enhancement of Amlodipine	Drug Delivery and Translational Research	Scopus preview - Scopus - Drug Delivery and Translational Research	DOI: 10.1007/s13346-017-0361-z	2
4	Lakshmi Sudeepthi	Protective Effect of Naringin Pentylenetetrazole(PTZ)-Induced Kindling; Possible Mechanisms of Anti Kindling, Memory Improvement, and Neuroprotection	Epilepsy & Behavior	Scopus preview - Scopus - Epilepsy and Behavior	DOI:https://doi.org/10.1016/j.yebeh.2017.07.011	1

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Research Article

RAPID AND ECONOMICAL QUANTITATIVE DETERMINATION OF SEVERAL ANTIHYPERTENSIVE AGENTS IN PRESENCE OF HYDROCHLOROTHIAZIDE BY ISOCRATIC REVERSED-PHASE HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY IN THEIR PHARMACEUTICAL PREPARATIONS

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ABSTRACT

Objective: Objective of the present investigation is to develop a speedy isocratic reverse phase high-performance liquid chromatography (RP-HPLC) method for the separation and quantitative determination of 5 angiotensin II - receptor antagonists, namely, telmisartan, losartan, valsartan, olmesartan, irbesartan, and atenolol along with thiazide diuretics mostly hydrochlorothiazide (HCTZ).

Methods: RP-HPLC method was evolved using Welchrom C_{18} column (4.6 × 250 mm, 5 µm) as a stationary phase with the mobile phase comprising a variety of phosphate buffer with pH-3.3 and acetonitrile in the proportion of 50:50 v/v. The mobile phase was pumped at a current rate of 1 mL/minute. The detection wavelength was carried out at 230 nm.

Results: The total run time was 6 minutes and the elution window of only 3 minutes. The peaks were eluted with decorous resolution. The calibration curves were linear (r^2=0.9998) in all cases. The percentage relative standard deviation (RSD%) was <2% and average recovery was above 99.95%. The method was validated specificity, precision, and accuracy. High recovery values and low RSD% prove that this method is very accurate and reproducible. The developed method was applied to the estimation of the above-said drugs in binary combinations from different manufacturers which were a good agreement with label claim.

Conclusion: The important advantage of developed method was that the five individual drugs can be determined on a single chromatographic system without alteration in detection wavelength and mobile phase composition. This novel method was statistically validated as per ICH guidelines. The optimized method proved to be linear, accurate, and robust. Hence, the above said proposed method was found to be a rapid tool for the routine determination of the above-said drugs in alone or combination with HCTZ in quality control analysis without interference of excipients.

Keywords: Telmisartan, Losartan, Valsartan, Olmesartan, Irbesartan, Atenolol, Reversed-phase high-performance liquid chromatography.

 DOI: http://dx.doi.org/10.22159/ajpcr.2017.v10i12.18714.

INTRODUCTION

Angiotensin antagonists are the first major innovation in essential hypertension management as a first-line treatment. Antihypertensive agents are a largest drug class and hold a major share of the drug market, as hypertension is a major cause of health problems. Hydrochlorothiazide (HCTZ) acts on both RAS and sympathetic nerve system, thereby creating greater sensitivity to angiotensin receptor blockade (ARBs). This HCTZ is a good selection for use in combination with ARBs. ACE inhibitors are having major problems of cough, when compared to ARBs. All the existing ARBs and atenolol (ATEN) are in fixed-dose combination with HCTZ. According to the available present knowledge, no unique single reversed-phase high-performance liquid chromatography (RP-HPLC) method available for the determination of 5 angiotensin II-receptor antagonists, i.e. ATEN, telmisartan (TELM), losartan (LOSA), valsartan (VALS), olmesartan (OLME), and irbesartan (IRBE) along with thiazide diuretics mostly HCTZ. The present proposed method will help in determination of drugs in a single run, which reduces the analysis time and does not necessarily any separate method for each drug and combined tablet formulation. After a meticulous survey of literature reveals that there were some analytical methods have been reported for the determination of the drugs either individually or in combination with some additional drugs in tablet dosage forms and biological samples based on a wide variety of instruments such as spectrophotometric method [1], capillary electrophoresis [2], HPLC [3-16], LC-mass spectrometry (MS) [17,18], and LC-MS/MS [19-21]. Keeping in view of the complete evaluation the authors aim to develop a novel, simple, accurate, and sensitive method to determine combinations such as HCTZ with ATEN, HCTZ with TELM, HCTZ with LOSA, HCTZ with VALS, HCTZ with OLME, and HCTZ with IBRE without altering the detection wave length and chromatographic conditions.

METHODS

The above said standard drugs were gifted from Hetero Labs Ltd., Hyderabad, India. All other chemicals used in this method were purchased from Merck Chemical Division Ltd., Mumbai. HPLC grade acetonitrile, water, methanol, and triethylamine were obtained from Merck Pharmaceuticals Private Ltd., Mumbai, Ind. . Commercial tablets of the above said formulation were procured from local pharmacies.

Apparatus and Instruments

RP-HPLC was done on an isocratic HPLC (Shimadzu LC-20AT prominence LC) with a LC-20AT pump, manual Rheodyne injector with a loop volume of 20 µl, variable wavelength Shimadzu SPD-20 A prominence ultraviolet (UV) detector, and Welchrom C_{18} Column (4.6 × 250 mm, 5 µm particle size). The HPLC system was set with "Spin chrome" software. An electronic balance (Shimadzu TX223L), digital PH meter (Systronics model - 802), a sonicator (spectral lab, model

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Microneedle assisted transdermal delivery of zolmitriptan: effect of microneedle geometry, in vitro permeation experiments, scaling analyses and numerical simulations

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ORIGINAL ARTICLE

Effect of microneedles on transdermal permeation enhancement of amlodipine

Buchi N. Nalluri[1] · Chandrateja Uppuluri[1] · Jyothirmayee Devineni[1] · Atul Nayak[2] · Karthik J. Nair[3] · Benjamin R. Whiteside[3] · Diganta B. Das[2]

Accepted: 20 July 2016

Abstract The present study aimed to investigate the effect of microneedle (MN) geometry parameters like length, density, shape and type on transdermal permeation enhancement of amlodipine (AMLO). Two types of MN devices viz. AdminPatch® arrays (ADM) (0.6, 1.2 and 1.5 mm lengths) and laboratory-fabricated polymeric MNs (PM) of 0.6 mm length were employed. In the case of PMs, arrays were applied thrice at different places within a 1.77-cm^2 skin area (PM-3) to maintain the MN density closer to 0.6 mm ADM. Scaling analyses were done using dimensionless parameters like concentration of AMLO (C_t/C_s), thickness (h/L) and surface area of the skin (Sa/L^2). Microinjection moulding technique was employed to fabricate PM. Histological studies revealed that the PM, owing to their geometry/design, formed wider and deeper microconduits when compared to ADM of similar length. Approximately 6.84- and 6.11-fold increase in the cumulative amount (48 h) of AMLO permeated was observed with 1.5 mm ADM and PM-3 treatments respectively, when compared to passive permeation amounts. Good correlations ($R^2 > 0.89$) were observed between different dimensionless parameters with scaling analyses. The enhancement in AMLO permeation was found to be in the order of 1.5 mm ADM ≥ PM-3 > 1.2 mm ADM > 0.6 mm ADM ≥PM-1 > passive. The study suggests that MN application enhances the AMLO transdermal permeation and the geometrical parameters of MNs play an important role in the degree of such enhancement.

Keywords Amlodipine · Histological examination · Microneedle geometry · Scaling analyses · Transdermal permeation

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Introduction

Delivering medicines to the systemic circulation through the skin is considered as a good alternative to conventional oral or parenteral routes of administration owing to the advantages like lack of pain, ease of administration, etc., thus improving patient compliance while improving the overall therapeutic gain of the drug by bypassing the gastrointestinal tract, avoiding hepatic first pass metabolism, maintaining a constant and prolonged drug level in plasma, etc. [1, 2]. These advantages make transdermal drug delivery particularly interesting and beneficial in the management of conditions like hypertension that impose the burden of repeat dosage and chronic administration of medicines via conventional routes.

Hypertension, reputed as 'the silent killer', is affecting about 70 million people and accounts for 9.4 million deaths worldwide every year. It is arguably the most important risk factor for coronary heart disease and stroke [3, 4]. Amlodipine (AMLO) besylate is a calcium channel blocker used to treat hypertension and associated cardiovascular diseases. On oral administration, it undergoes extensive first-pass metabolism and has an oral bioavailability (BA) of only 60–65% and is also associated with several side effects such as nausea, stomach pain, flushing, etc., [5, 6]. Hence, transdermal delivery of AMLO may alleviate the side effects and improve the BA and overall patient compliance towards medication. However,

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Protective effect of naringin on pentylenetetrazole (PTZ)-induced kindling; possible mechanisms of antikindling, memory improvement, and neuroprotection

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ABSTRACT

The present study investigated the effects of Naringin on seizure severity, progress of kindling, memory impairment, oxidative stress, neurochemicals, and neural damage in Pentylenetetrazole (PTZ)-induced kindling. Alternate intra-peritoneal injections of PTZ induced kindling at 22 injections of PTZ. In comparison with the PTZ group, pretreatment with Naringin 30 min prior to PTZ administration and on a PTZ-free day was found to lead to a decreased seizure score, a mitigated progress of kindling, decreased transfer latency, and increased total number of arm entries, % alternation behavior in Y maze, and % conditioned avoidance response in a pole climbing apparatus. Biochemical analysis of the frontal and temporal cortexes and the hippocampus of the brain showed that Naringin attenuated the level of lipid peroxidation (MDA) and augmented the reduced glutathione, superoxide dismutase, catalase, and total thiol results in decreased oxidative stress compared with the PTZ group and control group. Investigation of neurochemicals revealed a minute change in gamma amino butyric acid (GABA), glutamate and dopamine, and decreased AChE in the three regions. Increased CA1 neuronal density in the hippocampus and increased cell density in the frontal and temporal regions indicate the potential of naringin to act against PTZ-induced kindling, memory impairment, oxidative stress, neurochemical changes, and histological aberrations.

1. Introduction

Epilepsy is a chronic neurological disorder and is the second leading cause of mortality in the world. It strikes approximately 70 million people worldwide, and an ample availability of both conventional and newer antiepileptic drugs (AEDs) plays a key role in the management of epilepsy. However, consistent pharmacotherapy for patients with epilepsy has presented pharmacoresistant or drug-resistant or intractable epilepsy and exhibited epilepsy-associated comorbidities such as depression and cognitive impairment due to uncontrollable seizures and underlying pathology [1].

The comorbidities of epilepsy, if not handled cautiously as a group of diseases or disorders, rise day-by-day. Among all the additional disease or disorders, cognitive impairment is a common comorbidity associated with long-term use of AEDs for epilepsy management, AEDs-related adverse effects, and underlying epileptic pathology [2]. Drug resistance and comorbidities associated with epilepsy are not attributed to a single complication; there is a communal matrix of oxidative stress and neurochemical changes, and these two histological changes in the brain together engender comorbidities [3–6].

Pharmacoresistant epilepsy and associated comorbidities are two different conditions that interfere with the therapy of epilepsy, and the management of epilepsy with chronic use of current AEDs alone could aggravate these two conditions due to their adverse drug reactions and by augmenting oxidative stress in a patient's brain. The pentylenetetrazole (PTZ)-kindled animal model is an indistinguishable model of clinically resistant epilepsy [7–12]. Considering the above, the chemical (PTZ) kindling model has become a pivotal and handy drug-resistant epilepsy model to explore oxidative stress, neurochemical alterations, and structural changes in brain [13–17].

A plethora of reports exists on flavonoids amplifying the role of plant metabolites in the management of epilepsy because of their antioxidants, and in a few, flavonoids alone and in combination with AEDs alleviated the epilepsy and associated comorbidities in animal models [18–20]. Naringin is a flavanone glycoside [21,22] (4′,5,7-trihydroxyflavanone 7-rhamnoglucoside) that possesses potent anti-inflammatory [23], antianxiety [24], antiepileptic [25], antioxidant [26–28], and $GABA_A$ [29] stimulatory activities. A recent study of naringin acting against PTZ-induced seizures reported its antiepileptic

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