Liquid chromatographical methods for determination of selected antihypertensive drugs: a review

N.Delhiraj*,1, S.Anbazhagan2,

*Research scholar,Acharya Nagarjuna University, Department of Pharmacy,Guntur-522510, Andhra Pradesh, India
1Department of Pharmaceutical analysis, AnnabattuniSatyaNarayanaPharmacy College, Burripalem Road, Tenali-522201, Guntur (Dt), Andhra Pradesh, India.
2Professor, Department of Pharmaceutical analysis,Surya school of pharmacy, Surya Nagar, GST Road, Vikravandi-605652, Villupuram (Dt), Tamil Nadu,India

*Corresponding author: e-mail: pharmaraj1981@gmail.com

ABSTRACT

This work summarizes of the analytical methods reported in the literature for the separation and quantification using several liquid chromatographic methods for the determination of antihypertensives in biological matrices and pharmaceutical formulations have been discussed in the course of this review, namely RPHPLC, HPTLC and LC-MS methods; their selectivity, sensitivity, accuracy and reproducibility make them a good choice for analysis.

KEY WORDS: Hypertension, analysis, Liquid chromatography.

INTRODUCTION

Hypertension is one of the most serious diseases of the XXI century concerning about 20-30% of the world population of adults. Early detection and proper pharmacotherapy of hypertension could decrease the risk of stroke, left ventricular hypertrophy, cerebral hemorrhage, cerebral vessel disease or peripheral artery disease (Szajajderman, 1998; Kupershmit, 1998). Diuretics, particularly thiazides and thiazide-like, loop diuretics and potassium sparing diuretics are applied in the hypertension treatment. From treatment perspective, complexes consisting of the selective and nonselective ß-adrenergic receptor antagonists and α-adrenergic receptor antagonists, vasodilators, calcium channel blockers, ACE inhibitors (from angiotensin-converting enzyme) and angiotensin receptor antagonists play significant role. Diversity of chemical structures present in a group of hypotensive drugs encourage for searching new methods useful in their quantitative analysis. In this review by taking into account, the number of liquid chromatography methods discussed previously by Stolarczykin (2010), that leads to the availability of fast, selective, sensitive, precise and accurate analytical methods for the quantitative determination of selected antihypertensive drugs in biological fluids and pharmaceutical formulations.


Table 1. Liquid chromatography methods for determination of Anti-Hypertensives

<table>
<thead>
<tr>
<th>Antihypertensives</th>
<th>Method</th>
<th>Detection</th>
<th>Sample</th>
<th>Column</th>
<th>Mobile phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telmisartan and Amlodipine besylate</td>
<td>HPLC</td>
<td>UV=237nm</td>
<td>Pharmaceutica ls</td>
<td>Symmetry C18 column (250 mm x 4.6 mm i.d., 5µm)</td>
<td>methanol, Acetonitrile, Potassium dihydrogen phosphate buffer (60:40; pH 4.0)</td>
</tr>
<tr>
<td>Eprosartan and Hydrochlorothiazide</td>
<td>HPLC</td>
<td>UV=240nm</td>
<td>Pharmaceutica ls</td>
<td>Phenomenex C18 column (250 mm x 4.6 mm i.d., 5µm)</td>
<td>0.5% formic acid, methanol, Acetonitrile (80:25:20; pH 2.8)</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>LC-MS-MS</td>
<td>u/z 225.2 →129.5</td>
<td>mouse plasma and brain</td>
<td>Agilent ZORBAX SB-C18</td>
<td>0.01 mol/l methanol: ammonium acetate (60:40, v/v)</td>
</tr>
<tr>
<td>Losartan, Amlodipine besylate and Hydrochlorothiazide</td>
<td>HPLC</td>
<td>UV=238nm</td>
<td>Pharmaceutica ls</td>
<td>Kromasil C-18 (5µm, 250*4.6 mm)</td>
<td>Acetonitrile, 0.025 mol/L Potassium dihydrogen phosphate buffer (43:57; pH 3.7)</td>
</tr>
<tr>
<td>Amlodipine and valsartan</td>
<td>HPLC</td>
<td>UV=270nm</td>
<td>Pharmaceutica ls</td>
<td>Phenomenex C18 (250 mm x 4.6 mm i.d., 5µm)</td>
<td>acetonitrile: 50mM potassium dihydrogenorthophosphate buffer (pH 3.5) ratio 50:50/v/v</td>
</tr>
<tr>
<td>Torasemide, Irbesartan and Olmesartanmedoxomil</td>
<td>HPLC</td>
<td>UV=280nm</td>
<td>Pharmaceutica ls</td>
<td>Waters Atlantis d C18 (250 mm x 4.6 mm. i.d., 5µm)</td>
<td>phosphate buffer (pH 3.6): acetonitrile: methanol (46:44:10v/v/v),</td>
</tr>
<tr>
<td>Telmisartan and Atorvastatin calcium</td>
<td>HPTLC</td>
<td>Densitometric</td>
<td>Pharmaceutica ls</td>
<td>Silica gel G 60 F$_{254}$, HPTLC plates</td>
<td>toluene: methanol (7: 3, v/v)</td>
</tr>
<tr>
<td>Olmesartan</td>
<td>HPLC</td>
<td>UV=257nm</td>
<td>Pharmaceutica ls</td>
<td>Agilent, Exclipse XDB-C18 column</td>
<td>acetonitrile: methanol: water: glacial acetic acid (40:35:25:0.1 v/v/v/v) chloroform: methanol: formic acid (8:1.5:0.5 v/v/v)</td>
</tr>
<tr>
<td>Olmesartan</td>
<td>HPTLC</td>
<td>UV=257nm</td>
<td>Pharmaceutica ls</td>
<td>Silica gel G 60 F$_{254}$ HPTLC plates</td>
<td>chloroform: acetonitrile: toluene: glacial acetic acid, (1:8:1.0v/v/v)</td>
</tr>
<tr>
<td>Atenolol and Hydrochlorothiazide</td>
<td>HPLC</td>
<td>UV=286nm</td>
<td>Pharmaceutica ls</td>
<td>Zorbax SB-CN (250 x 4.6 mm), 5µm</td>
<td>Water: Buffer: Methanol (50:35:15)</td>
</tr>
<tr>
<td>Olmesartan and Amlodipine besylate</td>
<td>HPLC</td>
<td>UV=238nm</td>
<td>Pharmaceutica ls</td>
<td>Kromasil C-18(5µm, 250*4.6 mm)</td>
<td>Acetonitrile 0.05 mol/L, Potassium dihydrogen phosphate buffer (50:50)</td>
</tr>
</tbody>
</table>
Atorvastatin calcium and Amlodipine besylate  
HPLC | UV=240nm | Phenomenex C18 column (250 mm x 4.6 mm i.d., 5µm) | methanol, Acetonitrile, 0.05mol/L, Potassium dihydrogen phosphate buffer (20:50:30; pH 3.5)

Telmisartan and Hydrochlorothiazide  
HPLC | UV=238nm | ODS Hypersil C-18 (5µm,250*4.6 mm) | Acetonitrile 0.05 mol/L, Potassium dihydrogen phosphate buffer (60:40; pH 3.0)

Telmisartan  
HPLC | UV=245nm | Hypersil BDS C-18 (5µm,250*4.6 mm) | methanol, Acetonitrile (40:60)

Hydralazine  
HPLC | UV=408nm | Human plasma | methanol: Acetonitrile: aqueous triethylamine phosphate buffer (80:20, v/v - pH 3)

CONCLUSION

This work is a comprehensive and critical review of the analytical methods reported in the literature for the determination of selected antihypertensive drugs in biological matrices and pharmaceutical formulation. Overall, it should be noted that a large number of liquid chromatographic methods have been reported. These methods constitute useful tools for pharmacokinetic and toxicological studies or for quality control tests. Moreover, some of them may support the routine therapeutic drug monitoring of these antihypertensive drugs in clinical practice.

REFERENCES


