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## SIMULTANEOUS ESTIMATION OF DRUGS ATENOLOL AND AMLODIPINE- A REVIEW

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### Abstract

The combination of Atenolol-Amlodipine is a fixed dose combination is introduced in India, having better therapeutic profile. Atenolol is a  $\beta$  adrenoceptor blocking agents and competitively inhibit the actions of adrenergic agonist on  $\beta$ -receptors. Amlodipine is a prototype second generation dihydropyridine calcium channel blocker. It produces less reduction of myocardial contractility. It was found that both the drugs are estimated by various analytical methods individually. Spectrophotometry, Spectrofluorimetry, Spectrocolorimetric and Chromatographic methods are required for their stability studies. There is only one chromatographic method was reported for their simultaneous estimation by HPTLC in its combined dosage forms. So it was felt that there is a need to develop a simple, accurate and precise analytical method for the simultaneous estimation of Atenolol-amlodipine by RP-HPLC in its combined tablet dosage forms.

**Key Words:** RP HPLC, Validation, Atenolol, Amlodipine.

### Drug Profile

#### Introduction

The combination of Atenolol-Amlodipine is a fixed dose combination is introduced in India, having better therapeutic profile.

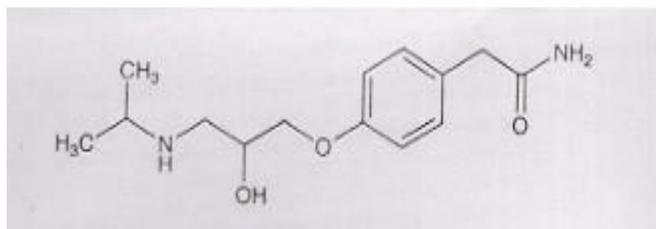
**Composition:** Each tablet contains

Atenolol : 50 mg

Amlodipine : 5 mg

## Atenolol

### Chemical structure<sup>1</sup>:



Molecular formula	:	C <sub>14</sub> H <sub>22</sub> N <sub>2</sub> O <sub>3</sub>
Molecular weight	:	266.34
Chemical name	:	4-[2-Hydroxy-3-[(1-methyl ethyl) amino]propoxy] benzeneacetamide
Melting range	:	146.0-148.0

### Description<sup>2,3</sup>:

Appearance : White or almost white powder

**Solubility:** Freely soluble in methanol, DMF, Soluble in acetic acid , DMSO, Sparingly soluble in 96% ethanol. Slightly soluble in water, isopropanol, very slightly soluble in acetone, Dioxane, Insoluble in acetonitrile, ethyl acetate, chloroform.

**Therapeutic Category:** Cardio vascular drug- β-adrenergic blocker, antihypertensive

### Mechanism of Action<sup>4</sup>:

All β adrenoceptor blocking agents are synthetic compounds and competitively inhibit the actions of adrenergic agonist on β-receptors. β-adrenoceptors are located predominantly in heart (beta-1), in the arteries and arterioles of skeletal muscle (beta-2), where their stimulation induces cardiac excitation, peripheral vasodilation, and bronchial relaxation respectively. β-blockers combines reversibly with these receptors to block the responses to sympathetic nerve stimulation or circulating catecholamines.

### Pharmacokinetics<sup>5</sup>:

A relatively selective β<sub>1</sub>-blocker having low lipid solubility. It is incompletely absorbed orally, but first pass metabolism is not significant. Because of longer duration of action, once daily dose is often sufficient. It is excreted in urine, mostly as glucuronides.

**Therapeutic Indications:<sup>6</sup>**

It is indicated for the treatment of

- ❖ Hypertension
- ❖ Angina pectoris
- ❖ Cardiac arrhythmias
- ❖ Myocardial infraction
- ❖ CHF
- ❖ Thyrotoxicos
- ❖ Migrane
- ❖ Anxiety
- ❖ Glaucoma
- ❖ Hypertrophic cardiomyopathy

**Adverse Effects:**

1. Accentuates myocardial insufficiency
2. Bradycardia
3. Worsens chronic obstructive lungs disease
4. Exacerbates variant (prinzmental's) angina
5. Plasma lipid profile may be altered on long term use
6. Tiredness and reduce exercise capacity

**Contraindications<sup>7</sup>:**

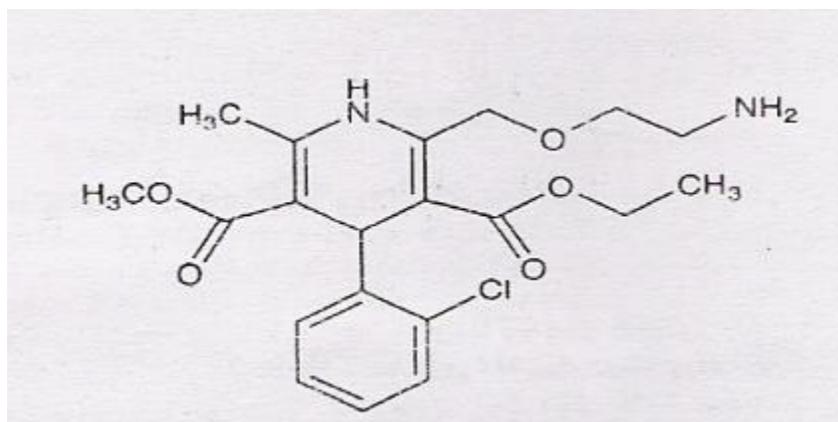
Beta-blockers are contraindicated in sinus bradycardia; greater than first degree heart block; congestive heart failure; Cardiogenic heart shock; Overt cardiac failure and hypersensitivity to beta-blockers. Beta-blockers are contraindicated in the management of myocardial infraction patients with a heart rate below 45 beats/min heart block greater than first degree (PR interval more than 0.24 sec); systolic blood pressure less than 100mmHg; or moderate to severe heart failure.

### Dosage And Administration:

Once daily dose is sufficient. Available as

Betacard	-	25 mg tab
Aten	-	50 mg tab

### Chemical Structure:



**Amlodipine**

### Chemical Name:

2-[(2-Aminoethoxy)methyl]-4-(2-chloro phenyl)-1, 4-dihydro-6-methyl -3,  
5-pyridinedicarboxylic acid, 3-ethyl, 5-methyl ester;

Molecular formula : C<sub>20</sub>H<sub>25</sub>ClN<sub>2</sub>O<sub>5</sub>

Molecular weight : 408.88

Melting range : 1780-1790C

**Description**<sup>10,11</sup> : Crystal white powder

### Solubility:

Freely soluble in methanol, DMF, Soluble in acetic acid DMSO, Sparingly soluble in 96% ethanol. Slightly soluble in water, isopropanol, very slightly soluble in acetone, Dioxane, Insoluble in acetonitrile, ethyl acetate, chloroform.

Therapeutic category : Antianginal, Antihypertensive

**Mechanism of Action<sup>12</sup>:** Amlodipine is a prototype second generation dihydropyridine calcium channel blocker. It produces less reduction of myocardial contractility. It can be safely combined with thiazides, beta-blocker, ACE inhibitors and nitrates.

**Pharmacokinetics:**

Pharmacokinetically it is the most distinct DHP(dihydropyridine). It has complete but slow oral absorption: peak reaches after 6 to 9 hours-the early vasodilator side effects (palpitation, flushing, headache, postural dizziness) are largely avoided. Because of less extensive and less variable first pass metabolism, its oral bioavailability is higher and more consistent. Volume of distribution and  $t^{1/2}$  are exceptionally long: diurnal fluctuation in blood level is small and action extends over the next morning.

**Therapeutic Indications<sup>13</sup>:**

- ❖ Angina pectoris
- ❖ Hypertension
- ❖ Arrhythmias
- ❖ Hypertrophic cardio myopathy

**Adverse Effects:**

Incidence of side effects is low, but the profile is similar to verapamil. It also increases plasma digoxin, like verapamil.

Diltizem should not be given to the patients with pre existing sinus, A-V nodal or myocardial disease. Only low doses should be given to the patients on  $\beta$ - blockers.

**Contraindications<sup>14</sup>:**

Amlodipine is contraindicated in left ventricular dysfunction, cardiogenic shock, sick sinus syndrome, and II and III degree A-V block.

**Dosage And Administration<sup>15</sup>:**

5-10 mg OD

**Marketed Brands Available:**

Amcard - 2.5 mg tab

Amlopin - 5 mg tab

**Conclusion:** It is clear from the present study that if Atenolol-Amlodipine are simultaneously estimated by RP-HPLC and more advanced methods than their formulations are simple, accurate, specific and precise in operation and can be employed for estimation of Atenolol-Amlodipine in its combined tablet dosage forms. This is also helpful to standardise the developed method, to analyse the marketed formulation for their reliability and accuracy, to perform the recovery studies and to validate the method for their accuracy, precision and reproducibility. So more analytical research are needed for making their formulations more potent.

### References

1. Indian pharmacopoeia. Controller of publications, Delhi, 1996, Page no: 145.
2. Martin Dale's The Complete "Drug Reference", 32<sup>nd</sup> edition, 1999, Page no:825-826
3. The Merck Index. 12<sup>th</sup> edition, Merck and co. Inc. New Jersey, U.S.A., Page no: 145-146.
4. Barar, F.S.K. Essentials of Pharmacotherapeutics, Third edition, 2000, S. Chand & company ltd. New Delhi, Page no: 211-212.
5. Good Man & Gilmann's "The Pharmacological Basis of Therapeutics" 10<sup>th</sup> edition.; 2001, Page no:256.
6. Tripathi, K.D. Essentials of Medical Pharmacology, Fifth edition, 2003, Jaypee Brothers Medical Publishers(p) ltd New Delhi, Page no: 127.
7. Barar, F.S.K. Essentials of Pharmacotherapeutics, Third edition, 2000, S. Chand & company ltd. New Delhi, Page no: 214.
8. CIMS APR 2003, Page no: 104-105.
9. The Merck Index. 12<sup>th</sup> edition, Merck and co. Inc. New Jersey, U.S.A., Page no: 86-87.
10. Martin Dale's The Complete "Drug Reference", 32<sup>nd</sup> edition, 1999, Page no:822-823.
11. Drug facts and comparisons, Facts and Comparisons ST-Louis Missouri. A Walter Kluwear Company, 50<sup>th</sup> edition 1996, Page no: 793.

12. Barar, F.S.K. Essentials of Pharmacotherapeutics, Third edition, 2000, S. Chand & company ltd. New Delhi,

Page no: 246.

13. Tripathi, K.D. Essentials of Medical Pharmacology, Fifth edition, 2003, Jaypee Brothers.

14. Good Man & Gilman's "The Pharmacological Basis of Therapeutics" 10<sup>th</sup> edition.; 2001, Page no:858-859.

15. CIMS APR 2003, Page no: 102-105.

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