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A REVIEW ON ANTIHYPERTENSIVE MEDICINES FOSINOPRIL SODIUM AND HYDROCHLOROTHIAZIDE BY ANALYTICAL TECHNIQUES

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ABSTRACT:

The main goal of this study is to bring together and evaluate widely disparate material from published studies on viable, reliable, and efficient analytical techniques for estimating all-important antihypertensive medication components. The data and recommendations presented below may help to facilitate and guide the future into how to best use analytical techniques such as UV Spectroscopy, High-Performance Liquid Chromatography (HPLC), High-Performance Thin Layer Chromatography (HPTLC), Gas Chromatography (GC), and others to determine antihypertensive analytes in the formulation. The work presented here focuses on the application of several analytical approaches for estimating antihypertensive medications in API and formulation. HPLC is a widely available method of testing in the pharmaceutical laboratory, it should be the method of choice for a comprehensive determination of all components, according to the studied literature.

Keywords: Antihypertensive analytes, HPLC, HPTLC, UV

INTRODUCTION:

One of the top causes of death in the globe is hypertension. Medication and lifestyle changes can help to prevent it. Blood pressure (BP) readings taken in the office, out-of-office BP readings using ambulatory blood pressure monitoring, and self-blood pressure (BP) readings taken at home are all useful techniques for detecting hypertension. High blood pressure caused by changes in environmental and lifestyle

factors with no known cause is known as primary hypertension. Secondary hypertension can be caused by toxins, iatrogenic illnesses, or hereditary abnormalities. CVD, atherosclerosis, renal disease, diabetes mellitus, metabolic syndrome, preeclampsia, erectile dysfunction, and vision loss are all caused by chronically high blood pressure (hypertension). Changes in lifestyle are implemented (for example, a diet rich in fruits and vegetables) **[1]**.

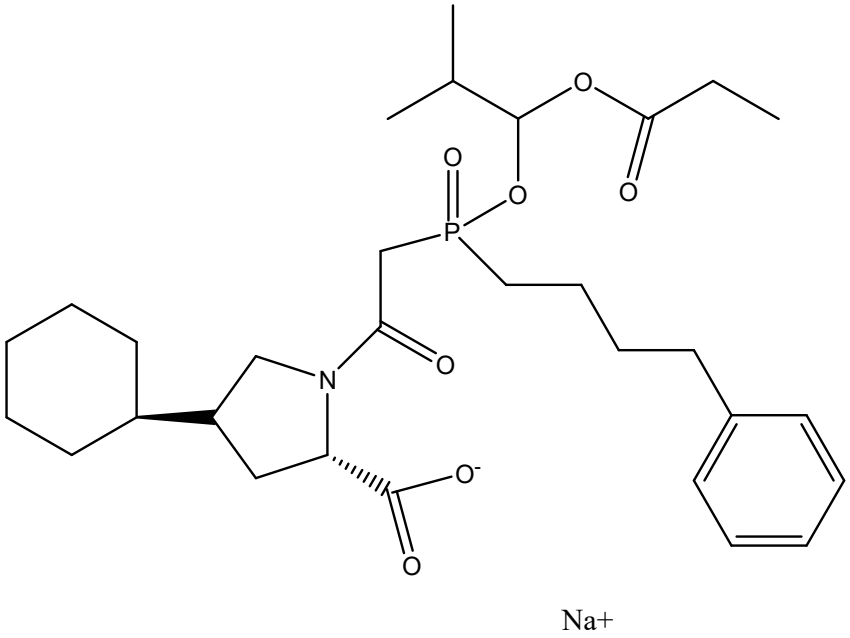

Figure 1: Fosinopril Sodium

CHEMICAL NAME	**SODIUM;(2*S*,4*S*)-4-CYCLOHEXYL-1-[2-[[(1*S*)-2-METHYL-1-PROPANOYLOXYPROPOXY] -(4-PHENYLBUTYL) PHOSPHORYL] ACETYL] PYRROLIDINE-2-CARBOXYLATE**
MOLECULAR FORMULA	**$C_{30}H_{35}NNaO_7P$**
MOLECULAR WEIGHT	**585.64gm/mol**
PHYSICAL PROPERTIES	**White crystalline powder. Soluble in water, slightly soluble in methanol, and insoluble in acetonitrile**
MELTING POINT	**183-187°C**

Hydrochlorothiazide:

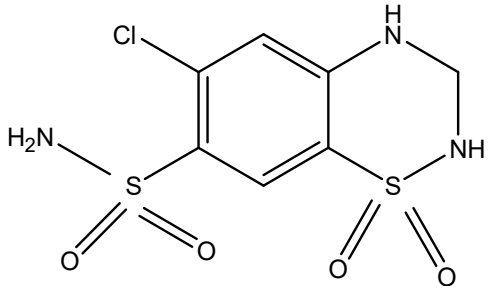

Figure 2: Hydrochlorothiazide

CHEMICAL NAME	6-chloro-1,1-dioxo-3,4-dihydro-2*H*-1λ^6,2,4-benzothiadiazine-7-sulfonamide
MOLECULAR FORMULA	$C_7H_8ClN_3O_4S_2$
MOLECULAR WEIGHT	297.7gm/mol
PHYSICAL PROPERTIES	White crystalline powder. Soluble in methanol
MELTING POINT	273-275^OC

Analytical methods:

The creation and validation of analytical methods are crucial in discovering, developing, and manufacturing pharmaceuticals. Combination medicines are pharmaceuticals that combine the therapeutic effects of two or more treatments in one product to address previously unmet patient needs. Analytical chemists responsible for developing and validating analytical procedures may face difficult issues with these combination products. This study discusses the various simultaneous estimation approaches for pharmacological products containing antihypertensive analytes (spectrophotometric, High-Performance Liquid Chromatography (HPLC).

Table 1: Various U.V. spectroscopic methods for the determination of Fosinopril sodium and Hydrochlorothiazide single and its combination with other drugs have been reported

S. No.	Drugs	Description	Reference
1.	Fosinopril sodium	Detection: 208nm, 217.4nm Solvent: Methanol Linearity range: 1-8µg/ml, 1-6µg/ml Correlative coefficient: 0.9929, 0.9937	[2]
2.	Hydrochlorothiazide	Detection: 272nm Solvent: Distilled water, 0.01N sodium hydroxide Linearity range: 5.00µg/ml- 30.00µg/ml (distill. Water), 1.00µg/ml-30.00µg/ml (0.01N sodium hydroxide) Correlative coefficient: 0.999, 0.998	[3]
3.	Fosinopril sodium and Hydrochlorothiazide	Detection: 227.6nm, 276.4nm Solvent: Methanol, 0.1N NaOH Linearity range: 4.0µg/ml-50.0µg/ml	[4]
4.	Nebivolol hcl and hydrochlorothiazide	Detection: 287nm, 271nm Solvent: Methanol Linearity range: 10-80 µg/ml, 2-16µg/ml Correlative coefficient: 0.999	[5]
5.	Eprosartan Mesylate and Hydrochlorothiazide	Detection: 274.5nm, 249.1nm Solvent: 0.1M sodium hydroxide Linearity range: 6-36µg/ml (Eprosartan Mesylate) 1-10µg/ml (Hydrochlorothiazide) Correlative coefficient: 0.9997, 0.9998	[6]
6.	Valsartan, Amlodipine Mesylate, and Hydrochlorothiazide	Detection: 245nm, 265nm, 279nm Solvent: Methanol: Water (70:30) Linearity range: 8-80µg/ml (Valsartan) 1-10µg/ml (Amlodipine Mesylate) 2-20g/ml (Hydrochlorothiazide) Correlative Coefficient: 0.9994, 0.9996, 0.9998	[7]

Table 2: Various HPLC methods for the determination of Fosinopril sodium and Hydrochlorothiazide single and its combination with other drugs have been reported

S. No.	DRUG	DESCRIPTION	REFERENCE
7.	Fosinopril sodium and hydrochlorothiazide	Detection wavelength: 208 nm Mobile phase: 0.2%w/v phosphoric acid in water and acetonitrile (30:70) Flow rate: 0.5 ml/min Linearity range: Fosinopril sodium: 10-50 µg/ml Hydrochlorothiazide: 6.25-31.35 µg/ml Column: C18	[8]
8.	Fosinopril Sodium and its related Impurities	Detection wavelength: 210 nm Mobile phase: HPLC Water: Acetonitrile:1% orthophosphoric acid in water in the ratio of 65:25:10 (v/v/v) Flow rate: 1.2 mL/min Linearity range: 250µg/mL Column: Hypersil ODS Retention time: 50. 3min	[9]
9.	Fosinopril sodium, hydrochlorothiazide	Detection wavelength: 226 nm Mobile phase: buffer (pH6.0, adjusted with orthophosphoric acid), acetonitrile, and methanol in the ratio of 80:10:10v/v. Flow rate: 0.8 ml/min. Linearity range: fosinopril sodium: 10-50 µg/mL hydrochlorothiazide: 6.25-31.35 µg/mL Column: X-terra(C8) Retention time: Fosinopril sodium:2.1min Hydrochlorothiazide:3.3min	[10]
10.	Hydrochlorothiazide	Detection wavelength: 272 nm Mobile phase: 50: 50 acetonitrile: water Flow rate: 1 mL/min Linearity range: 2–10 and 10–30 µg/mL Column: C_{18}Inertsil and C_{18}Zorbax columns Retention time: 3.5 min	[11]
11.	Nebivolol and Hydrochlorothiazide	Detection wavelength: 254 nm Mobile phase: acetonitrile: 50mM ammonium acetate (adjusted to pH 3.5 using orthophosphoric acid) (70:30 v/v) Flow rate: 1.0 ml/min Retention time: Nebivolol: 3.32min Hydrochlorothiazide: 4.25 min	[12]
12.	Olmesartan and Hydrochlorothiazide	Detection wavelength: 254 nm Mobile phase: methanol/acetonitrile (pH 2.6, 70:30, v/v) Flow rate: 1.0 mL/min Linearity range: 20-80 µg/mL Column: reversed-phase C-18 column	[13]
13.	Hydrochlorothiazide, Amiloride Hydrochloride	Detection wavelength: 260 nm Mobile phase: 0.05 MKH_2PO_4: acetonitrile: triethylamine (90: 10: 0.3 by volume, pH 3.6) Flow rate: 1.5 mL min^{-1} Linearity range: 1-50, 1-20, 1-12 and 1-20 µg mL^{-1} Column: ODS-C_{18}	[14]
		Detection wavelength: 287 nm Mobile phase: phosphate buffer 5.5 and acetonitrile in a ratio of 50:50 v/v Flow rate: 1.0ml/min Linearity range:	

14.	**Methyldopa and Hydrochlorothiazide**	**Methyldopa: 62.5-375.0µg/ml Hydrochlorothiazide: 6.25 to 37.5µg/ml Column: Hypersil BDS C8 column Retention time: Methyldopa: 2.17min Hydrochlorothiazide: 3.56min**	**[15]**
15.	**Hydrochlorothiazide**	**Detection wavelength: 254 nm Mobile phase: phosphate buffer (pH 2.5) and acetonitrile (50:50 v/v) Flow rate: 0.6 mL/min Linearity range: 20-60 µg/mL Column: Kromasil C_{18} Retention time: 3.47 min.**	**[16]**
16.	**Telmisartan and hydrochlorothiazide**	**Detection wavelength: 271 nm. Mobile phase: acetonitrile:0.05 M KH_2PO_4 pH 3.0 (60:40) Flow rate: 1.0 ml/min Linearity range: Telmisartan: 4.1-20.48 µg/ml Hydrochlorothiazide: 1.28-6.4 µg/ml Column: ODS Hypersil C18 Retention time: Telmisartan: 5.19 min Hydrochlorothiazide: 2.97 min**	**[17]**

CONCLUSION:

The desire to improve one's quality of life has sparked a lot of study into drug design, bioavailability, and safety. As a result, extremely sensitive and specific methods of analysis are required to meet these objectives. An analytical method for analyzing a pharmacological component in a specific matrix should be created critically, taking into account various available instruments and knowing their performance in terms of selectivity, sensitivity, convenience of use, speed of analysis, and other factors.

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