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A REVIEW ON METADOXINE; ANALYTICAL PROFILE AND RECENT ADVANCEMENTS

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ABSTRACT

Pyridoxine derivative metadoxine has shown great promise as a medicinal agent, especially for the treatment of liver ailments. This article offers a thorough analysis of the pharmacological characteristics of metadoxine, covering its mode of action, recommended uses, and side effects. The paper also discusses the analytical techniques used to quantify metadoxine in a variety of matrices, including biological fluids and pharmaceutical formulations. It is stressed how crucial reliable and precise analytical techniques are for therapeutic medication monitoring, quality assurance, and pharmacokinetic research.

Keywords: metadoxine, pharmacological properties, analytical methods, liver diseases, chromatography, mass spectrometry.

1. INTRODUCTION

Alcohol intoxication, both acute and chronic, is treated with metadoxine, often referred to as pyridoxine-pyrrolidone carboxylate. Blood alcohol removal from the body is accelerated by metadoxine. The main conditions for which metadoxine is prescribed are fatty liver disease and alcoholism. Alcohol is better metabolized and liver function is enhanced. The possibility of using it to treat cognitive impairment and ADHD has also been studied.

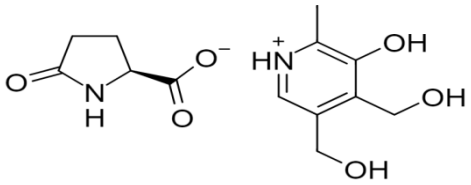

Figure-1: Structure of Metadoxine

Chemical name: Chemically it is 5-Oxo-L-proline-4, 5-bis (hydroxymethyl)-2- methylpyridin-3-ol

Chemical formula: $C_{13}H_{18}N_2O_6$

Molecular weight: 298.295 $g.mol^{-1}$

Category: Hepatoprotective.

Pyridoxine and pyrrolidone carboxylate (PCA) ion pair salts are combined to form metadoxine. Vitamin B6, pyridoxine, is a precursor of coenzymes that include pyridoxal 5'-phosphate (PLP), which prevents acetaldehyde from inactivating adenosine triphosphate (ATP) and speeds up the metabolism of ethanol. Serotonin (5-HT), epinephrine, norepinephrine, and GABA are four major neurotransmitters that are also produced by pyridoxal phosphate-dependent enzymes.

Table 1: Spectrophotometric analysis techniques reported in the literature for the determination of metadoxine

Title	Method	Wavelength	Description	Reference
Derivative spectroscopy: Development and validation of new spectroscopic method for the estimation of metadoxine in bulk and solid dosage form	UV-Visible spectrophotometric	292nm for zero order 302nm for first order 270nm for second order 314nm for third order	The proposed method is precise, accurate, linear, stable and reproducible and can be extended to the analysis of Metadoxine in bulk and tablet formulations.	12
Quantification of metadoxine in	UV-Visible	291nm	The proposed methods are sensitive, accurate,	17

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pharmaceutical dosage forms by uv-spectrophotometry	spectrophotometric		reproducible and useful for routine determination of metadoxine in pharmaceutical dosage forms	
New spectrophotometric methods for estimation of Metadoxine in bulk and pharmaceutical formulations based on redox and oxidative coupling reactions	Spectrophotometric method	Method- 660nm Method- 460nm	Method A in the concentration range of 5-30 µg/mL Method B in concentration of 424 µg/mL.	19

Reported HPLC methods of Metadoxine

Title	Method	Mobile phase	Stationary phase	Wavelength	Reference
Stability-Indicating HPLC Method for the Determination of Metadoxine as Bulk Drug and in Pharmaceutical Dosage Form	HPLC	methanol and water (50: 50, *v/v*).	C_{18} (5-micron, 25 cm × 4.6 mm, i.d)	286nm	9
Determination of metadoxine in human serum by HPLC and its pharmacokinetic studies	HPLC	methanol-5 mmol·L $^{-1}$ ammonium acetate (14:86, v/v	C_{18} column (250 mm ×4.6 mm, 5 µm)	286nm	8
Pharmacokinetics of metadoxine for injection after repeated doses in healthy volunteers	HPLC	1:9 (v/v) of acetonitrile-phosphate buffer (pH 7, 0.05 mol/L).	C_{18} column 125×4 mm (5 µm)	315nm	7
Development of RP-HPLC Method for estimation of metadoxine in pharmaceutical formulations.	RP- HPLC	water: methanol 85:15 v/v	C18 column (250 mm length, 4.6 mm internal diameter and 5µm particle size)	290nm	6
Application of stability-indicating HPTLC method for quantitative determination of metadoxine in pharmaceutical dosage form	HPTLC	acetone-chloroform-methanol-ammonia (7.0:4.0:3.0:1.2, v/v/v/v)	TLC aluminium plates precoated with silica gel 60F-254	315 nm	13
Method Development and Validation of Metadoxine and Atazanavir in Solid Dosage Form by RP-HPLC	RP-HPLC	Methanol and 5mM Tetra Butyl Ammonium Hydrogen Sulphate (TBHS) 50:50.	C18 RP Column (250 mm x 4.6mm x 5 µm)	274(Metadoxine), 249(Atazanavir)	16

Determination of the Related Substances in Metadoxine by HPLC-ELSD	HPLC-ELSD	0.2 mol·L 1 trifluoroacetic acid-methanol(92:8)	Agilent Zorbax SB-C18 column(250 mm×4.6 mm,5 μm)	-	18

2. CONCLUSION

According to the review's findings, there are numerous spectroscopic and chromatographic methods available for studying a single hepatoprotective ingredient, such metadoxine. It was discovered that the majority of chromatographic methods included a mobile phase consisting of acetonitrile, methanol, water, and ammonium acetate to improve resolution. For the chromatographic approach, the flow rate and an appropriate retention period are recorded. Consequently, it has been determined that every procedure is simple, accurate, repeatable, economical, and exact. HPLC was the method most often employed because it provided the best possible **sensitivity, reproducibility, dependability,** and analysis time.

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