

**SUDAN UNIVERSITY OF SCIENCE
AND TECHNOLOGY**
College of Graduate Studies

**Stability Study of Atenolol and validation of its HPLC
Quantification method**

**دراسة ثبات لعقار الاتينالول والتحقق من طريقة التحليل الكمي بواسطة
الクロماتوغرافيا السائلة عالية الاداء**

By

**Nasreldien Mohamed Ahmed Abdulhakam
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Supervisor

Prof. Dr. Ahmed Elsadig Mohammed Saeed

Co supervisor

Prof. Dr .Mohammed Almukhtar A/Aziz

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DEDICATION

*TO the soul of my father and mother
To my wife. To my sons and
daughters.*

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ABSTRACT

In this study the stability of Atenolol in solid and liquid forms was investigated, towards high temperature, sunlight, UV light, some common excipients and hydrolysis in acidic media and alkaline media, using high performance liquid chromatography (HPLC).the results obtained were compared with the UV spectrophotometric method. A new stability indicating (HPLC) method was validated for assaying Atenolol.

It was found that Atenolol was thermally stable in solid and aqueous solution form up to 70°C. On exposure to UV radiation, however, the solution form was unstable, and the photo decomposition showed first order kinetic reaction.

UV scanning of Atenolol solution with different pH values showed bathochromic (red) shift as λ_{max} was changed to longer wavelength with increased pH of the solution.

Atenolol hydrolysis in acidic and alkaline media showed also first order reaction kinetic and the reaction rate was temperature dependant. Both hydrolyzed compounds from acidic and alkaline media have same retention time in the chromatograms.

Comparing the results of hydrolysis obtained from (HPLC) with that obtained by UV.Spectrophotometric analysis, the UV results showed no hydrolysis .The method is not stability indicating method.

A new analytical high performance liquid chromatography (HPLC) method was validated for Quantification assay for Atenolol with

accuracy 99.55% and linearity 99.99% and compared with (USP) method.

الخلاصة

فى هذه الدراسة تم بحث ثبات عقار الاتينالول فى شكله الجاف و المحلول نحو درجات الحرارة العالية والرطوبة النسبية و ضوء الشمس والأشعة فوق البنفسجية و بعض المواد الصيدلانية الغير فعالة وايضا شملت الدراسة الاماهة فى الوسط الحمضى والوسط القلوى. تم التحليل بواسطة جهاز الكروماتوغرافيا السائلة عاليه الاداء ومقارنة النتائج مع التى تم تحليلها بواسطة طيف الاشعة فوق البنفسجية. تم انشاء والتحقق لطريقة جديدة للتحليل بواسطة جهاز الكروماتوغرافيا السائلة عاليه الاداء وهى طريقة كاشفة للثباتية.

اظهر الاتينالول ثباتية نحو درجات الحرارة العالية بشقيه الجاف والمحلول. ففي المحلول وجد انه لا يتغير الى 70 درجة مئوية وايضا لم يتاثر بضوء الشمس.

محلول الاتينالول يتاثر عند تعریضه للاشعة فوق البنفسجية ويحدث تفاعل ضوئي بحرکية تفاعل من الرتبة الاولى.

عند مسح محلول الاتينالول بجهاز الاشعة فوق البنفسجية في محاليل ذات اس هيدروجيني مختلف فانه يحدث تغير في موقع الامتصاص الاعلى حيث يزداد الى طول موجى اكبر بزيادة الاس الهيدروجيني للمحلول.

- تحدث الاماهة لعقار الاتينالول في الوسط الحمضى والقاعدى على السواء و يتبع التفاعلان حرکية تفاعل من الرتبة الاولى و معدل التفاعل يتغير مع تغير درجة الحرارة اي من التفاعلين نتج عنهما مركب له زمن استبقاء موحد كما ظهر في الكروماتوغرام.

- بمقارنة النتائج المتحصل عليها في تفاعل الاماهة للتحليل بواسطة جهاز الكروماتوغرافيا السائل عاليه الاداء و بواسطة طيف الاشعة فوق البنفسجية الاخيرة لم تظهر ان تفاعلا قد تم مما يدل على انها ليس طريقة كاشفة للثباتية.

- تم انشاء والتحقق لطريقة جديدة للتحليل بواسطة جهاز الكروماتوغرافيا السائلة عاليه الاداء وهى طريقة كاشفة للثباتية. ذات دقة 99.55% وعلاقة خطية 99.99%.

List of Abbreviation

API	Active Pharmaceutical Ingredient
FPP	Finished Pharmaceutical Product
FDC	Fixed Dose Combination
GMP	Good Manufacturing Practice
WHO	World Health Organization
ICH	International Conference on Harmonization
RH	Relative humidity
FT-IR	Fourier Transform Infrared
NMR	Nuclear Magnetic Resonance
RSD	Relative Standard Deviation
CV	Coefficient of Variation
BP	British Pharmacopoeia
HPLC	High Performance Liquid Chromatography
GPR	General Purpose Reagent
BPRCS	British Pharmacopoeia Reference Chemical Substance
DAD	Diode Array Detector
UV	Ultra Violet light
USP	United States Pharmacopoeia
λ_{max}	Maximum wavelength absorption
ICI	Imperial chemical industries

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