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Research Article

DEVELOPMENT AND VALIDATION OF STABILITY INDICATING METHOD FOR THE SIMULTANEOUS DETERMINATION OF TAMSULOSIN AND DUTASTERIDE IN BULK DRUGS AND PHARMACEUTICAL DOSAGE FORMS USING UV SPECTROPHOTOMETRIC METHOD

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ABSTRACT

A new simple, precise method for simultaneous estimation of Tamsulosin and Dutasteride using UV spectroscopy has been developed. The present method involves the solving of simultaneous equations (Vierodt's method) for UV spectroscopy. Tamsulosin and Dutasteride were found to have absorbance maxima at 226nm and 206 nm respectively in methanol Both these drugs obeyed Beer's law in the concentration range of 1-30 µg/ ml. The high values of correlation coefficients (r2) indicated good linearity of Calibration curve for both the drugs. The linearity curved showed %RSD NMT 2. The recoveries of Tamsulosin and Dutasteride from the standard mixture solution were found to be 100.1% and 99.50 % respectively. Forced degradation was also performed using 0.1N HCl,).1N NaOH, thermal degradation, light and oxidation with 1 – 3% H2O2 .it was found. Only small amount of drug got degraded which was within the limits. The method developed is simple and precise showing 100.1% and 108.1% purity for Tamsulosin and Dutasteride respectively and all other validation parameters were found to be within limits %RSD NMT 2. Hence the method developed can be used for routine lab analysis.

Keywords: Simultaneous Estimation, UV spectroscopy, Tamsulosin and Dutasteride, Calibration curve.

INTRODUCTION

Tamsulosin (TAM), chemically 5-[(2R)-2-{[2-(2-ethoxyphenoxy) ethyl] amino} propyl]-2-methoxybenzene-1-sulfonamide, is a white crystalline powder and is freely soluble in methanol, acetonitrile, ethanol and partially insoluble in water. Categorized as antineoplastic agents, adrenergic alpha-Antagonists. Tamsulosin is a selective antagonist at alpha-1A and alpha-1B-adrenoceptors in the prostate, prostatic capsule, prostatic urethra, and bladder neck. At least three discrete alpha1-adrenoceptor subtypes have been identified: alpha-1A, alpha-1B and alpha-1D; their distribution differs between human organs and tissue. Approximately 70% of the alpha1-receptors in human prostate are of the alpha-1A subtype. Blockage of these receptors causes relaxation of smooth muscles in the bladder neck and prostate.

Route of elimination of tamsulosin hydrochloride is extensively metabolized by cytochrome P450 enzymes in the liver and less than 10% of the dose is excreted in urine unchanged. %). Half-life of drug is 4 weeks.

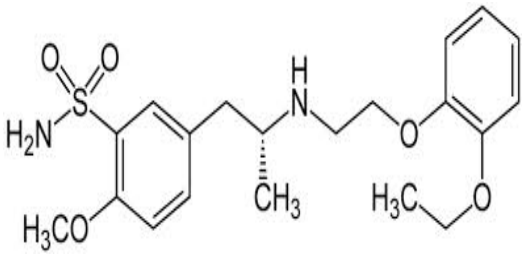

Figure 1. Structure of Tamsulosin

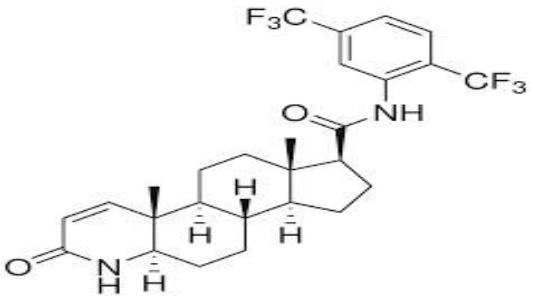

Figure 2. Structure of Dutasteride

Dutasteride(DUTA)Chemically(1S,2R,7R,10S,11S,14S,15S)-N-[2,5 bis (trifluoromethyl) phenyl] - 2, 15-dimethyl-5-oxo-6 azatetracyclo[8.7.0.0^{2,7}.0^{11,15}]heptadec-3-ene-14-carboxamide, is a white powder and is freely soluble in acetonitrile, ethanol, methanol and partially insoluble in water. Categorized in Enzyme Inhibitors, Anti-baldness Agents, Antihyperplasia Agents. Belongs to a class of drugs called 5-alpha-reductase inhibitors, which block the action of the 5-alpha-reductase enzymes that convert testosterone into dihydrotestosterone (DHT).

Route of elimination of Dutasteride is extensively metabolized in humans and excreted mainly in feces, Protein binding of albumin (99%) and α-1 acid glycoprotein (96.6%). Half-life of drug is 5 weeks.

Combination therapy as a fixed-dose dutasteride &tamsulosin for lower urinary tract symptoms secondary to benign prostatic enlargement, which is composed of two active ingredients, tamsulosin and dutasteride. Tamsulosin is a α-adrenoceptor blocker that is relatively selective for the α (1A)-adrenoceptor subtype within the prostatic smooth muscles. The inhibition of α (1A)-adrenoceptors results in smooth muscle relaxation.

Dutasteride is an inhibitor of 5α-reductase, an enzyme that is responsible for the conversion of testosterone to its active form dihydrotestosterone. This occurs in the prostate, liver and skin. 5α-Reductase results in the shrinkage of the prostatic epithelium and reduction in the size of the prostate. No clinical studies have been performed on the fixed-dose dutasteride/tamsulosin combination, although several clinical trials have been conducted on the combination therapy of 5α-reductase and α-adrenoceptor blockers. The combination therapy was associated with significant improvements in the symptom compared to tamsulosin or dutasteride as monotherapy. It is therefore logical to combine the two medications into one tablet.

Literature indicates RP-HPLC method was determination of TAM and DUTA in pharmaceutical formulations is reported, but stability indicating method by UV spectroscopy method was not yet reported for the simultaneous determination of TAM and DUTA.

The objective of present study is to develop stability indicating method for estimation of Dutasteride and Tamsulosin in tablet dosage from using Uv spectrophotometry and validate as per ICH guidelines such that it is used for routine lab analysis.

MATERIALS AND METHODS

Chemicals and Reagents: Pure drug samples of TAM and DUTA were gifted by Dr.Reddy's laboratories (Hyderabad, India) with declared purity of 99.41% and 99.64% respectively. All the chemicals and reagents used are of analytical grade.

Instrumentation: UV double beam spectrophotometer - PG Instrumentations ltd. Model no. 60 consisting of fixed slit width of 2 nm & 1 cm quartz cells was used. Electronic balance of Wensar weighing scales Model PGB-600, volumetric glassware was used of class A.

Solubility studies of drug: Proper wavelength selection of method depends upon the nature of sample and its solubility. 1mg of standard drug sample was taken and its solubility was checked in various solvents like Distill water, Acetonitrile, methanol, 0.1N HCl, Phosphate Buffer, Acetone, this studies are carried out at 25 ± 2 0 C.

PREPARATION OF STANDARD STOCK SOLUTIONS

Preparation of Tamsulosin standard stock solution (1000 µg/ml):

Accurately weighed 100mg of Pure TAM (API) was taken and dissolved in 100ml of diluent in a 100ml of volumetric flask to get a concentration of 1000µ g/ml and sonicated for 15min.From primary std stock solutions 1ml solution was pipette out in a 10 ml of volumetric flask and volume was made up to the mark with diluents to get a concentration of 100µ g/ml. From above stock solution 2ml was transferred into another 10 ml volumetric flask and diluted to 10ml with methanol to get a concentration of 20µ g/ml.

Preparation of Dutasteride standard stock solution (100µ g/ml): Accurately weighed 10mg of Pure DUTA (API) was taken and dissolved in 100ml of diluent in a 100ml of volumetric flask to get a concentration of 100µ g/ml and sonicated for 15min. From primary stock solutions 1ml solution was pipette out in a 10 ml of volumetric flask and volume was made up to the mark with diluent to get a concentration of 10µ g/ml. From above stock solutions 2ml was transferred into another 10ml Volumetric flask and diluted to 10ml with methanol to get a concentration of 2 µ g/ml.

Selection of wave length: 2ml of working standard solution of TAM (100µg/ml) and DUTA (10µg/ml) was transferred into two 10ml volumetric flasks separately and diluted to 10ml with methanol to get 20µ g/ml of TAM and 10µ g/ml of DUTA . These two solutions were taken and scanned between 200nm to 400nm on scan/spectrum mode using methanol as blank. As per spectra recorded DUTA shows λ max at 206nm (λ1) and TAM shows λ max at 226 nm (λ2) and respectively.

Plotting of calibration curve:

The calibration curves were plotted over a concentration range of 1-15 µg/ml for TAMSULOSIN and DUTASTERIDE. Accurately measured standard solutions of TAMSULOSIN and DUTASTERIDE (1, 1.5, 2, 2.5,3 ml) were transferred to a series of 10 ml of volumetric flask and diluted to the mark with methanol. The absorbances of the solutions were measured at 226 nm and 206 nm against methanol as blank. The calibration curves were constructed by plotting absorbances versus concentrations and the regression equations calculated.

METHOD VALIDATION

Specificity: To check the specificity of method the solutions of mixed standard solution consisting TAM (20mcg/ml) and DUTA (10 mcg/ml) , sample (tablet) solution were prepared and spectra was recorded for both and compared with each other .Both spectra shows peaks at 206nm and 226nm for DUTA and TAM respectively.

Linearity and range:

The linear response of samples was determined over a five concentration range of 50-150 % for Tamsulosin and Dutasteride. Accurately measured standard solutions of DUTA and TAM (1, 1.5, 2, 2.5, 3 ml) were transferred to a series of 10 ml of volumetric flask and diluted up to the mark with methanol. The absorbances of the solutions were measured at 206 nm and 226 nm against methanol as blank. The calibration curve of absorbance vs. respective concentration was plotted and correlation coefficient (r2) and regression line equations for EZET and GLIM calculated.

Accuracy (standard addition method):

Accuracy is determined by calculating percentage recovery, recovery studies is carried by standard addition method where to the formulation (pre analyzed sample), the reference standards of the TAM and DUTA were added at three concentration level of 75%, 100%, 125% of assay conc and recovery studies were carried out three times and the percentage recovery and percentage mean recovery were calculated for drug.

Precision:

a) System precision: The variation of results on same day analysed by actual determination of absorbance of fixed concentration of the standard preparation(API) consisting of 20µ g/ml for TAM and 10 µ g/ml. of DUTA for six times on the same day wwithin the Beer's range and Finding out the absorbance at two wave length..

b) Method precision: Variation of results on same day analysed by actual determination of absorbance fixed concentration of the sample (Tablet) preparation consisting of 20µ g/ml for TAM and 10µ g/ml. of DUTA for six times on same day within the Beer's range and finding out the absorbance at two wave lengths.

Limit of detection (LOD) & Limit of quantification (LOQ):

LOD &LOQ was calculated by taking the slope and standard deviation of response from calibration curve of analyte which it used to determine linearity. It is calculated as

$LOD = 3.3\sigma/S$ $LOQ = 10\sigma/S$

Where, σ = the standard deviation of the response

S = the slope of the calibration curve

The slope S may be estimated from the calibration curve of the analyte.

Robustness: To demonstrate the robustness of the method, prepared solution as per test method and absorbance was checked at variable conditions like using different wavelength λmax (max ± 1 nm).

Ruggedness: The ruggedness of the method was studied by the determining the analyst to analyst variation by performing the Assay by two different analysts under same operational and environmental conditions.

System suitability: Standard solutions consisting TAM 20mcg/ml & DUTA 10 mcg/ml were prepared and absorbance was checked at 206nm and 226 nm for six times. The system suitability parameters like absorbance, Mean, SD, %RSD factor were evaluated.

Simultaneous estimation of Duta and tam in tablet formulation: (assay)

From calibration curve the concentration 100% is selected to perform assay

Preparation of test solution with tablets: 10 tablets were weighed and powdered tablet equivalent to 10 mg DUTASTERIDE and 20mg TAMSULOSIN was weighed and taken into 100ml volumetric flask then 50ml methanol was added and shaken well to dissolve tablet powder completely and volume was made up to mark with diluent then solution as sonicated for about 20min and filtered with whattman filter paper to remove particles if any. From the above stock solution 1ml of solution was withdrawn and taken in 10ml volumetric flask and volume was made up to mark with diluent. From this again the further dilution were prepared same as that of API to obtain concentration of 20µg/ml for DUTASTERIDE and 20µg/ml. of TAMSULOSIN. The concentration of TAM and DUTA was obtained from simultaneous equation.

CALCULATION:

For calculating assay simultaneous equation has been used here

$$Cx = \frac{(A2\ ay1 - A1\ ay2)}{(ax2\ ay1 - ax1\ ay2)}$$

$$Cy = \frac{(A1\ ax2 - A2\ ax1)}{(ax2\ ay1 - ax1\ ay2)}$$

Where: A1, A2 are absorbance of Formulation at 206 nm and 226 nm , ax1 and ax2 are absorptivity of DUTA at 20 6 nm and 226 nm , ay1 and ay2 are absorptivity of TAM at 206 nm and 226 nm , Cx and Cy are concentrations of TAM and DUTA respectively.

FORCED DEGRADATION STUDIES

Forced degradation studies are performed to prove the stability indicating property of the method.

1. Acid hydrolysis: Solution for acid degradation studies were prepared in methanol (20µg/ml of TAM and 10 µg/ml of DUTA) and add to it 1 ml 0.1 N HCl at room temperature (22°C) for 3 h of the sample preparation, therefore the sample was neutralized with 0.1 N base and analyzed at 206 nm and 226 nm of TAM and DUTA respectively taking mixture of 1 ml acid + 1 ml base diluted to 10 ml with methanol as blank.

2. Alkaline hydrolysis: Solution for base degradation studies were prepared in methanol (20 µg/ml of TAM and 10 µg/ml of DUTA) and to it add 1ml 0.1 N NaOH and kept at room temperature (22°C) for 3 hrs and the resultant the sample was neutralized with 0.1 N acid and analyzed at 206 nm and 226 nm of TAM and DUTA respectively taking mixture of 1 ml acid + 1 ml base diluted to 10 ml with methanol as blank

3. Thermal degradation: Fifty mg drug was weighed and kept in the oven and temperature was maintained at 80°C for 3 h, after that the solutions for photostability studies were prepared in methanol and the dilution (20 µg/ml of TAM and 10 µg/ml of DUTA) were prepared and analyzed in UV spectrophotometer at 206 nm and 226 nm of TAM and DUTA respectively.

4. Photolytic degradation: Fifty mg drug was weighed and kept in the UV chamber for 3 hrs at 365 nm wavelength, after that the solutions for photostability studies were prepared in methanol and the dilutions (20µg/ml of TAM and 10 µg/ml of DUTA) were prepared & analyzed in UV spectrophotometer at 206 nm and 226 nm of DUTA and TAM respectively

5. Oxidation degradation: (3%) H2O2: Solution for oxidative degradation studies were prepared in methanol (20 µg/ml of TAM and 10 µg/ml of DUTA) and 1 ml 3% H2O2 solution and kept at room temperature (22°C) and the resultant solutions analyzed 15 min after preparation at 206 nm and 226 nm of TAM and DUTA respectively.

Record the absorbance of stressed samples then compare it with absorbance of unstressed sample to determine the % degradation

$$\% \text{ degradation} = \frac{(\text{Response of unstressed sample}) - (\text{response of stressed sample})}{\text{Response of unstressed sample}} \times 100$$

RESULTS AND DISCUSSION

Solubility studies: various solvents like Acetonitrile, methanol, phosphate buffer etc were used to determine the solubility of TAM and DUTA. Among all these solvents it was found that both drugs showed excellent solubility in methanol. Hence methanol is selected as solvent for present investigation.

OPTIMISED METHOD CONDITIONS

1	**Diluent / solvent**	**methanol**
2	**Absorption maximum (λ max)**	TAMSULOSIN – 226 nm DUTASTERIDE - 206nm
3	**Working standard concentration**	TAMSULOSIN – 20 µg/ml DUTASTERIDE 10 µg/ml

CALIBRATION CURVE OF TAMSULOSIN AND DUTASTERIDE

TAMSULOSIN		**Dutasteride**	
mcg/ml	**Abs at 226nm**	**mcg/ml**	**Abs at 206 nm**
1	0.199	1	0.144
1.5	0.298	1.5	0.216
2	0.398	2	0.289
2.5	0.497	2.5	0.361
3	0.596	3	0.432
mean	0.3976	mean	0.2884
slope	0.1986	slope	0.1442
Correlation coeff	0.999998479	Correlation coeff	0.99998942

Table : 1linearity of DUTA

TAMSULOSIN	
mcg/ml	**Abs at 206 nm**
10	0.328
15	0.492
20	0.657
25	0.821
30	0.985
mean	0.6566
slope	0.03286
Correlation coeff	0.999999444

Table : 2 linearity of TAM at two wave lengths

TAMSULOSIN	
mcg/ml	**Abs at 206 nm**
10	0.328
15	0.492
20	0.657
25	0.821
30	0.985
mean	0.6566
slope	0.03286
Correlation coeff	0.999999444

Table : 3 Linearity data of TAM + DUTA

TAMSULOSIN + DUTASTERIDE tablet		
mcg/ml	**Abs at 226nm**	**Abs at 206nm**
50	**0.199**	**0.327**
75	**0.298**	**0.493**
100	**0.398**	**0.656**
125	**0.497**	**0.824**
150	**0.596**	**0.982**
mean	**0.3976**	**0.6564**
slope	**0.003972**	**0.006564**
Correlation coeff	**0.999998479**	**0.999960825**

Table : 4 linearity of DUTA

Conc 10 mcg/ml	Abs at 226nm
1	0.199
1.5	0.298
2	0.398
2.5	0.497
3	0.596
mean	0.3976
slope	0.1986
R^2	0.999998479

Table : 5 linearity of TAM

Conc 20 mcg/ml	Abs at 206 nm
2	0.328
3	0.492
4	0.657
5	0.821
6	0.985
mean	0.6566
slope	0.03286
R^2	0.999999444

Table : 6 Data of recovery studies

Injections	Abs At 206nm A1	Cx	Theoretical yield	% purity	Abs At 233nm A2	Cy	Theoretical yield	**% purity**
Avera Abs	**0.339**	**0.000216**	**0.0002**	**108%**	**0.656**	**0.000401**	**0.0004**	**100.1%**

Table : 7 showing system precision

Level of Addition	**drug**	**Amount Taken (µg/ml)**	**Amount spiked**	**Total amt taken**	**Amount Recovered µg/ml**	**% recovered**	**%average recovery**
	TAM	**1.5**	**0.5**	**2**	**1.99**	**99.55%**	**99.5%**
75%	**DUTA**	**15**	**5**	**20**	**19.99**	**99.99%**	**For TAM**
	TAM	**2**	**0.5**	**2.5**	**2.5**	**100%**	
100%	**DUTA**	**20**	**5**	**25**	**24.97**	**99.98%**	**100.1**
	TAM	**2.5**	**0.5**	**3.0**	**2.98**	**99.4%**	**%**
125%	**DUTA**	**25**	**5**	**30**	**30.03**	**101%**	**For DUTA**

Table : 8 Results of method precision

	DUTASTERIDE		TAMSULOSIN	
Sample	**Abs at 226nm**	**Abs at 206nm**	**Abs at 206nm**	**Abs at 226 nm**
Replicate -1	**0.398**	**0.289**	**0.655**	**0.251**
Replicate -2	**0.398**	**0.287**	**0.656**	**0.252**
Replicate -3	**0.399**	**0.289**	**0.655**	**0.251**
Replicate -4	**0.396**	**0.289**	**0.656**	**0.252**
Replicate -5	**0.398**	**0.288**	**0.654**	**0.253**
Replicate -6	**0.398**	**0.289**	**0.656**	**0.252**
Mean	**0.3978**	**0.2885**	**0.655**	**0.252**
SD	**0.001**	**0.001**	**0.001**	**0.001**
% RDS	**0.25**	**0.29**	**0.12**	**0.30**

Table : 9 showing LOD & LOQ

Tamsulosin 20 mg/ml + Dutasteride 10 mg/ml tablet		
S.No.	ABS at 226nm	ABS at 206nm
1	0.398	0.657
2	0.398	0.656
3	0.399	0.656
4	0.396	0.657
5	0.398	0.655
6	0.398	0.657
Avg	0.398	0.0000
stdev	0.0010	0.000816497
%RSD	**0.25**	**0.11**

ROBUSTNESS:

Table : 10 Robustness of DUTA

Robustness of Dutasteride at different wavelength			
s.no	**225nm**	**226nm**	**227nm**
1	0.396	0.398	0.399
2	0.397	0.398	0.399
3	0.396	0.399	0.400
4	0.397	0.396	0.400
5	0.397	0.398	0.399
6	0.397	0.398	0.399
AVG	**0.3967**	**0.398**	**0.3993**
SD	**0.001**	**0.0010**	**0.001**
%RSD	**0.13**	**0.25**	**0.13**

Table : 11 Robustness of TAM

Robustness of Tamsulosin at different wavelength			
s.no	**205nm**	**206nm**	**207nm**
1	0.656	0.657	0.658
2	0.655	0.656	0.659
3	0.655	0.656	0.659
4	0.654	0.657	0.659
5	0.655	0.655	0.659
6	0.654	0.657	0.659
AVG	0.6548	0.6563	0.659
SD	0.000	0.001	0.000
%RSD	**0.06**	**0.12**	**0.06**

RUGGEDNESS

Table : 12 Ruggedness of TAM

RUGGEDNESS of Tamsulosin with different analyst	**ABS at 206nm**	**AVG**	**SD**	**%RSD**
Analyst 1	0.655	**0.6533**	**0.001527525**	**0.21**
	0.652			
	0.653			
Analyst 2	0.657	**0.6563**	**0.00057735**	**0.21**
	0.656			
	0.656			
Analyst 3	0.656	**0.6567**	**0.00057735**	**0.21**
	0.657			
	0.657			

Table : 13 Ruggedness of DUTA

RUGGEDNESS of Dutasteride with different analyst.	**ABS at 226nm**	**AVG**	**SD**	**%RSD**
Analyst 1	0.398	**0.398**	**0.0010**	**0.25**
	0.398			
	0.399			
Analyst 2	0.396	**0.398**	**0.0010**	**0.25**
	0.398			
	0.398			
Analyst 3	0.398	**0.398**	**0.0010**	**0.25**
	0.396			
	0.398			

Table : 14 suitability for DUTA and TAM

S. No	REPEATIBILITY Of DUTASTERIDE	REPEATIBILITY OF TAMSULOSIN
	Abs at 206nm	Abs at 226 nm
1	**0.289**	**0.251**
2	**0.287**	**0.252**
3	**0.289**	**0.251**
4	**0.289**	**0.252**
5	**0.288**	**0.253**
6	**0.289**	**0.252**
Mean	**0.2885**	**0.252**
SD	**0.001**	**0.001**
%RSD	**0.29**	**0.30**

Table : 15 Results from calibration curve & assay using simultaneous equation method

CHARACTERISTICS	TAMSULOSIN	DUTASTERIDE	TAM + DUTA + SAMPLE
λ max	**226nm**	**206 nm**	**226 nm**
MEAN	**0.339**	**0.7936**	**0.2224**
SLOPE	**0.000216**	**0.03962**	**0.0022**
CORRELATION COEFF	**0.9998547**	**0.99998265**	**0.9998698**
% PURITY	**99.91%**	**99.99%**	**99.5%**
AMT taken and found in mg	**10.8 mg**	**20.1 mg**	**9.84mg**

Table : 16 Results of degradation studies

DEGRADATION PARAMETERS	Degradation time	Abs of degraded product	Abs of standard	% degradants
ACID DEGRADATION (0.1 N HCL)	**3 hrs**	**0.329 TAM** **0.784 DUTA**	**0.339 TAM 0.7936 DUTA**	**1.020%** **2.2%**
BASE DEGRADATION (0.1 N HCL)	**3 hrs**	**0.335 TAM** **0.781 DUTA**		**0.25%** **1.78%**
THERMAL DEGRADATION	**3 hrs**	**0.302 TAM** **0.684 DUTA**		**0.75%** **2.2%**
PHOTOLYTIC DEGRADATION	**3 hrs**	**0.296 TAM** **0.701 DUTA**		**0.87%** **1.3%**
OXIDATION WITH (3%) H_2O_2	**15 mint**	**0.338 TAM** **0.791 DUTA**		**0.50%** **0.4%**

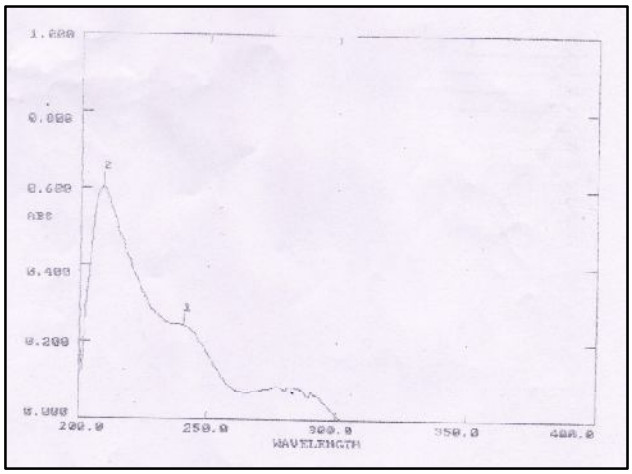

Fig. 1. UV Spectra of TAMSULOSIN

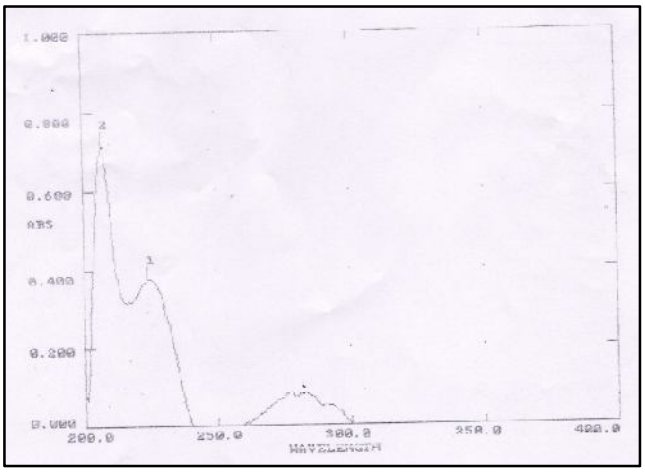

Fig. 2. UV Spectra of DUTASTERIDE

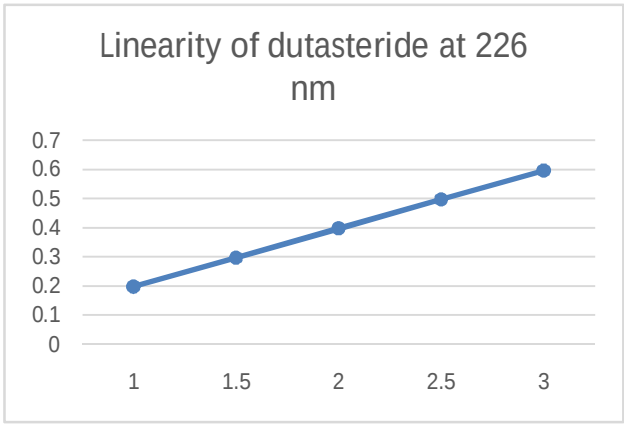

Fig.3. Calib curve of DUTA at 226nm

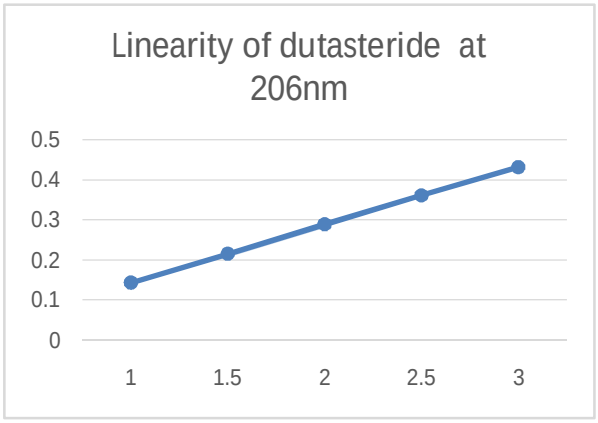

Fig.4. calib curve of TAM at 206nm

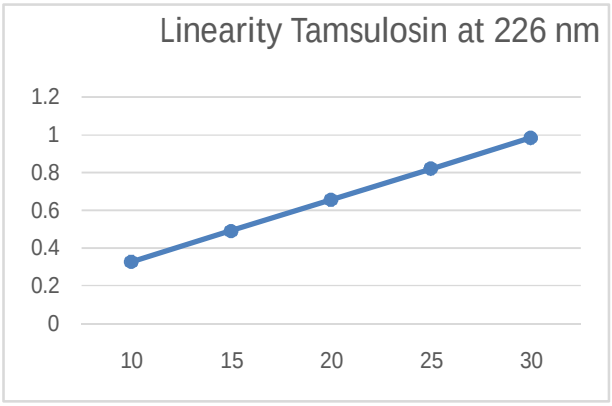

Fig. 5 linearity graph of TAM

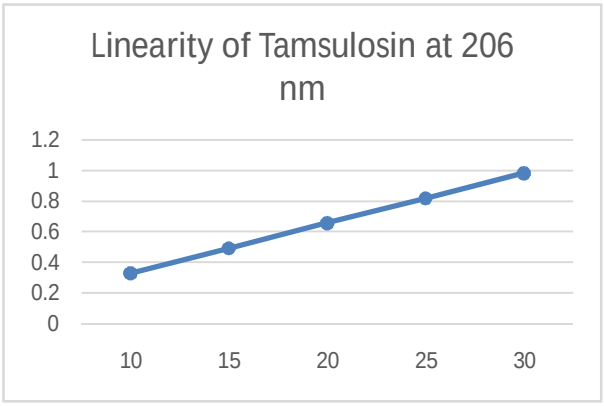

Fig.6 linearity graph of TAM

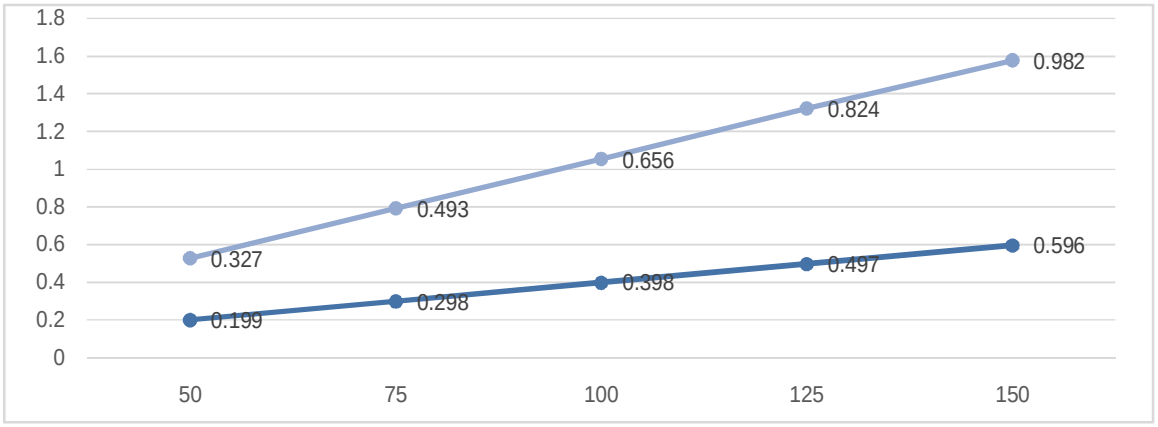

Fig. 7 Linearity graph of TAM + DUTA

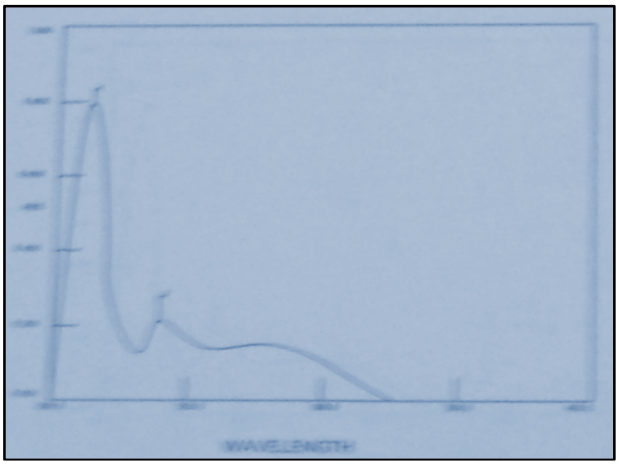

Fig. 8 UV spectra of standard

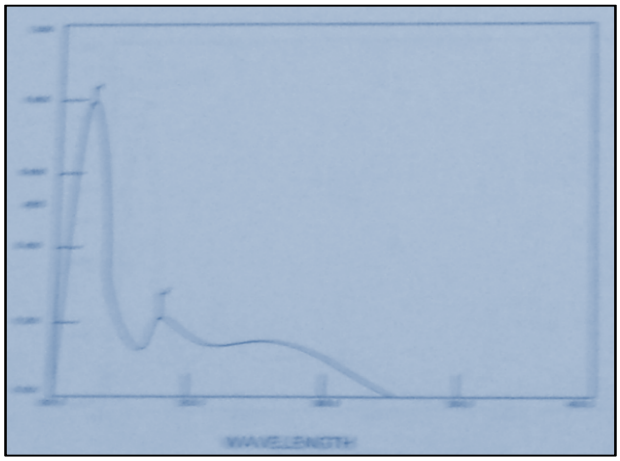

Fig. 9 UV spectra of sample

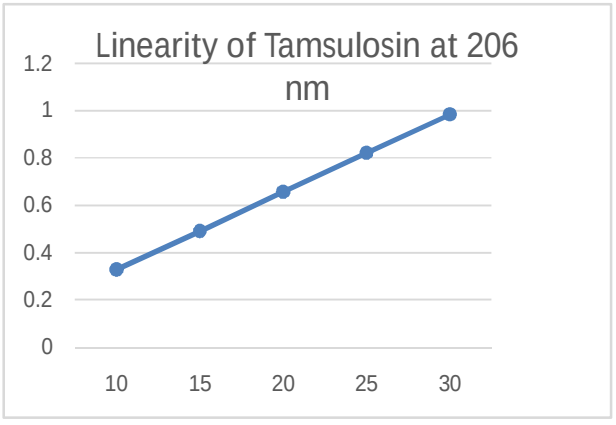

Fig. 10 Linearity graph of TAM

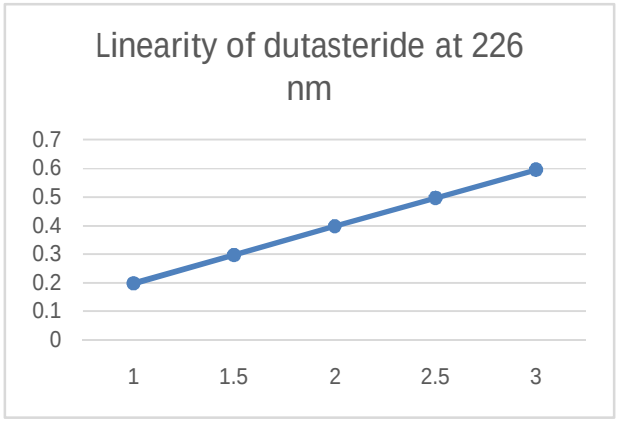

Fig. 11 Linearity graph of DUTA

Selection of wavelength: The standard solution of TAMSULOSIN and DUTASTERIDE are taken and scanned in UV spectrophotometer between 200nm to 400nm on scan/spectrum mode using methanol as blank. As per spectra recorded TAMSULOSIN show λ max at 226 nm and DUTASTERIDE shows at 206nm respectively.

The relationship between the concentration and absorbance of TAM and DUTA is linear in the range examined since all points lie in a straight line and the correlation coefficient is within limits.

METHOD VALIDATION:

Specificity: The UV graphs obtained depicts there is no interference of excipients, solvent and placebo with the absorbance of analyte which indicate that the method is specific for the analysis of analytes in their dosage form.

Linearity: The obtained absorbance values were plotted taking Conc vs. absorbance. The obtained was linear and correlation was found to be 0.99 for both drugs.

Recovery studies: The percentage mean recovery of DUTASTERIDE and TAMSULOSIN is 99.5% and 100.1 % respectively

Precision: The %RSD of the results was found to be below 2 %

Limit of detection (LOD) & Limit of quantification (LOQ):

LOD of this method was found to be for dutasteride 2.6 µg/ml and tamsulosin 26µg/ml. LOQ of dutasteride is 7.9µg/ml tamsulosin is 79 µg/ml

Robustness: The %RSD of DUTA and TAM at different wave length was within limits NMT The method was found to be Robust even at different wave lengths.

Ruggedness: The % RSD for assay was found to be below 2%

System suitability: %RSD was found to be not more than 2.0% for both TAM and DUTA.

Tablet analysis: From calibration curve the concentration 100% is selected to perform assay. The amount of DUTASTERIDE and TAMSULOSIN present in the taken dosage form was found to be108 % and 100.1% respectively.

Forced degradation studies:

The various degradation pathways studied are acid hydrolysis, basic hydrolysis, thermal degradation and oxidative degradation.Both the drugs were found to be stable in stress conditions.

CONCLUSION

The present method involves the solving of simultaneous equations (Vierodt's method) for Uv spectroscopy. Tamsulosin and Dutasteride were found to have absorbance maxima at 226nm and 206 nm respectively in methanol. Both these drugs obeyed Beer's law in the concentration range of 1-30 µg/ ml. The high values of correlation coefficients (r2) indicated good linearity of Calibration curve for both the drugs. The recoveries of Tamsulosin and Dutasteride from the standard mixture solution were found to be 100.1% and 99.50 % respectively. Forced degradation was also performed using 0.1N HCl, 0.1N NaOH, thermal degradation, light and oxidation with 1 – 3% H_2O_2. Only small amount of drug got degraded which was within the limits. The method developed is simple and precise showing 100.1% and 108.1% purity for Tamsulosin and Dutasteride respectively and all other validation parameters were found to be within limits %RSD NMT 2. Hence the method developed can be used for routine lab analysis.

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