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Simultaneous Estimation of Thiocolchicoside and Diclofenac Potassium by UV Spectrophotometer Using Multicomponent Method

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Abstract: A new simple, specific, precise and accurate multicomponent method has been developed for simultaneous estimation of Thiocolchicoside (THC) and Diclofenac potassium(DICP) in capsule formulation.
The detection of the constituents was done using UV detector at 254,259,265,271,286 for THC and DICP. Recovery, study values of THC and DICP is 100.04±0.34 and 99.98±0.27 respectively, relative standard deviation of less than 2% for the assay and linearity coefficient of 0.9998 that the method is precise, accurate and linear in the concentration given and demonstrated the method developed is rugged. Liner response obtained for THC was in the concentration range 20-100µg/mL and DICP in the range 20-100 µg/mL.
Key words: Thiocolchicoside, Diclofenac potassium, multicomponent.

Introduction:

Thiocolchicoside Chemically it is N-[3-(β-D-glucopyranosyloxy)-1,2-dimethoxy-10(methylthio)-9-oxo-5,6,7,9-tetrahydrobenzo [*a*] heptalen-7-yl] acetamide[1,2,3,4]. THC is a muscle relaxant. Its mode of action includes modulation of chemokine and prostanoid production and inhibition of neutrophil and endothelial cell adhesion molecules by which it interferes with the initiation and amplification of the joint inflammation.

Diclofenac potassium (DICP) chemically $C_{14}H_{10}C_{12}KNO_2$ and molecular weight 334.23. Chemically it is 2-[2,6dichlorophenylamino] benzene acetic acid potassium salt[5,6,7,8]. Diclofenac potassium is an orally administered phenyl acetic acid derivative with effect on a variety of inflammatory mediators. It is the non steroidal ant inflammatory drug. Diclofenac potassium provides symptomatic relief in a variety of painful condition.

Literature survey reveals that Spectrophotometric HPLC, RP-HPLC methods are available for determination of Diclofenac Potassium from pharmaceutical preparations and biological formulation More ever, the literature survey revealed that so far, no method has been reported for estimation of THC and DICP in combined dosage form, hence U V Spectrophotometric methods have been developed for simultaneous estimation of THC and DICP in capsule dosage form by multicomponent method.

Materials and Methods

Materials:

The pure drug THC (99%) and DICP (99%) donated by Ajanta Pharmaceutical Mumbai and Zim Laboratory Kalmeshwar Nagpur, were used as reference standard respectively. The capsule preparation was purchased from the local market.

Methods:

The sampling wavelengths 254,259,265, 271, 286 nm were selected on trial and error basis. The concentrations of individual drug (i.e.THC and DICP) in the respective six mixed standard solutions (Table 10) were feed to multicomponent mode of the instrument. All the six mixed standards were scanned in the range of 200 nm to290 nm

The basic necessity for the application of the proposed method is that at all the selected sampling wavelengths the mixed standard solutions must follow the Beer-Lambert's law. The study shows that at all the selected sampling wavelengths, the mixed standard solutions obey the Beer-Lambert's law.

Analysis of pharmaceutical Formulation:

For the simultaneous estimation of commercial formulation twenty capsule of THC (Labail claim: Thiocolchicoside 04 mg and Diclofenac potassium 50 mg) was taken. The average weight of capsule was determined. powder equivalent to 10 mg THC was accurately weighed, transferred to a 10 ml volumetric flask, dissolved in 10ml solvent for 20 minutes with vigorous shaking. Finally the volume was made-up to the mark with solvent. The solution was filtered through Whatman filter paper-41, first few drops were rejected. The filtrate was then appropriately diluted to get final concentration of 2 _g/ml of and 5 _g/ml of THC. Absorbance of this solution was measured at appropriate wavelengths and values were substituted in the respective formula to obtain concentration. The result of analysis was mentioned in **Table 1**.

Table 1:- Range for mixture

Name of drug	Concentration in (µg/mL)					
	1	**2**	**3**	**4**	**5**	**6**
THC	**2**	**4**	**6**	**8**	**10**	**12**
DICP	**2**	**4**	**6**	**8**	**10**	**12**

Table 2:- Analysis of standard laboratory mixture

S.N.	Amount of drugs taken (µg/mL)		Amount of drug estimated (µg/mL)		% of drugs estimated.	
	THC	DICP	THC	DICP	THC	DICP
1	2	2	1.99	1.98	99.5	99
2	4	4	3.97	3.99	99.25	99.75
3	6	6	5.96	5.89	99.33	98.16
4	8	8	7.98	7.99	99.75	99.87
5	10	10	9.94	9.96	99.4	99.6

Statistics

Drug	Mean	± SD	%RSD
THC	99.44	0.193	0.194
DICP	99.27	0.707	0.712

Table 3. Analysis Data of Tablet Formulation

S.N.	Amount of capsule powder taken (µg/mL)	Amount of drug estimated (µg/mL)		% of labeled claim	
		THC	DICP	THC	DICP
1	10	10.02	10.12	100.01	100.23
2	10	9.86	9.84	99.24	99.20
3	10	9.90	10.02	98.67	100.01
4	10	10.15	10.00	100.08	100.00

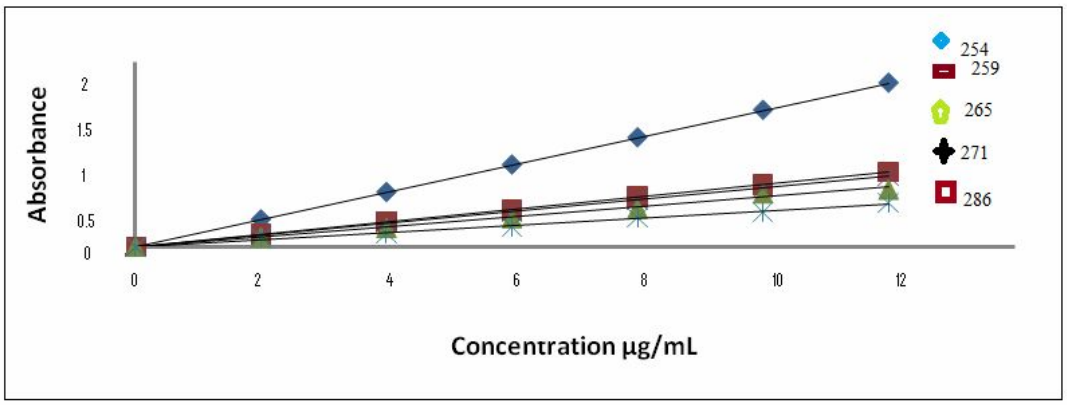
Statistics

Drug	Mean	± SD	%RSD
THC	99.49	51.87	1.912
DICP	99.86	52.048	1.913

Table 4- Results of ruggedness studies

Drugs	Parameter	Method precision	Intermediate Precision		
			Interday	Intraday	Different Analysts
THC	Mean± SD	99.18±1.2945	98.15± 1.124	99.91± 1.350	100.5± 0.912
	% RSD	1.2857	1.145	1.364	0.907
DICP	Mean± SD	99.91±0.5635	99.83± 1.004	98.741.675	99.78± 0.473
	% RSD	0.5639	1.005	1.696	0.474

Fig 1. Linearity graph of mixture at five selected wavelength



Validation of the proposed method

a) Accuracy: - Accuracy of the proposed method was ascertained on the basis of recovery studies performed by Standard addition method. The procedure for mixed standard solution is same as given in Table4.

bPrecision: - It is expressed as ±SD and % RSD of any measurements. Precision of estimation of THC and DICP by proposed method was ascertained by replicate analysis of homogenous samples of tablet powder. The results are also shown in Table 3.

c) Linearity and range: - The study was performed over the series of concentrations ranging from 2-10 µg/mL for mixture. The graphs of concentration against absorbance (**Fig.1)** found to be straight line over the concentration range of these range.

d) Ruggedness: - The studies were carried out for different parameters i.e. different elapsed times (intraday and interday) different analysts.

Recovery Study:

To check the accuracy of the developed methods and to study the interference of formulation additives, analytical recovery experiment was carried out by standard addition method. From the total amount of drug found, the percentage recovery was calculated. The results are reported in Table 5.

Table 5. Recovery Studies

S.N.	Amount of drugs added (µg/mL)		Amount of drugs recovered (µg/mL)		% of drugs recovered	
	THC	DICP	THC	DICP	THC	DICP
1	2	2	2.00	2.00	100	100
2	2	2	1.97	1.99	98.5	99.5
3	2	2	1.98	1.96	99	98
4	2	2	1.99	1.98	99.5	99

Statistics

Drug	Mean	± SD	% RSD
THC	99.25	0.6454	0.650
DICP	99.21	0.8539	0.860

* Recovery is mean of five estimation. Method Multicompanant method while Method 2 is simultaneous equation method and R.S.D is the relative standard deviation.

Result and Discussion:

Both the UV Spectrophotometric methods were found to be simple, accurate, economic and rapid for routine simultaneous estimation of THC and DICP, in capsule dosage forms. For both the methods, linearity was obtained in concentration range of 2-40 µg/ml and 1-50 µg/ml for THC and DICP respectively. Both the drug show good regression values at there respective wavelengths. Recovery was in the range of 99-101%; the value of standard deviation and % R. S. D are found to be < 2%; shows the high precession of the method.

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