Bull. Pharm. Sci., Assiut University, Vol. 46, Issue 2, 2023, pp.969-982.

Bulletin of Pharmaceutical Sciences
Assiut University
Website: http://bpsa.journals.ekb.eg/
e-mail: bullpharm@aun.edu.eg

A VALIDATED RP-HPLC METHOD FOR SEPARATION AND DETERMINATION OF ETORICOXIB AND PARACETAMOL IN BULK AND PHARMACEUTICAL DOSAGE FORM

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Etoricoxib is a non-steroidal, anti-inflammatory drug (NSAID) and a selective inhibitor of Cyclooxygenase 2 (COX2), which makes it safer on the gastrointestinal tract than the other NSAIDs. Given the importance of Etoricoxib's, its combination with paracetamol offers higher efficacy and fewer side effects. In addition to the popularity of this combination in the pharmaceutical industry and the diversity of its manufacturing companies, this study aims to develop a novel, precise, selective, rapid and economic assay method for the simultaneous quantitative determination of Etoricoxib and paracetamol in bulk and pharmaceutical dosage form using reverse phase HPLC. This developed method has a short run time of less than 4 minutes using a C18 column (150×4.6) mm 5µm, a mobile phase of methanol and ammonium acetate (pH =3.5) in a ratio (60:40), respectively. The elution was observed at 245 nm using a PDA detector; the retention times of paracetamol and Etoricoxib were found to be 2.493 and 3.64 min, respectively, and a resolution factor larger than 2. Linearity was established with correlation coefficient values of 0.9991, 0.9994 for both Etoricoxib and paracetamol drugs. Precision was within the relative standard deviation of less than 2% for both drugs, and the percentage recoveries were found to be 99.98% and 99.35% for paracetamol and Etoricoxib, respectively. LOD and LOQ of paracetamol were 1.4 µg/ml and 4.3 µg/ml, respectively, and 0.52 µg/ml and 1.6 µg/ml for Etoricoxib, respectively. The selectivity test results showed no interference from the tablet excipients during the separation process, which verifies that this method is easily applicable to quality control labs and pharmaceutical industries, in addition to being fast, accurate and cost-effective.

Keywords: *Etoricoxib, RP-HPLC, assay, validation, paracetamol, simultaneous*

INTRODUCTION

Unlike other non-steroidal anti-inflammatory drugs (NSAIDs), Etoricoxib inhibits Cyclooxygenase 2 (COX2) selectively without affecting COX1. Therefore, it inhibits the production of inflammatory prostaglandins without affecting the production of prostaglandins that play crucial roles such as protecting the gastric mucosa, maintaining renal activities, and many other vital roles[1].

This group was first discovered in 1999 to avoid the side effects that result from using conventional NSAIDs, especially gastrointestinal ones[2]. Etoricoxib, which was developed and introduced into clinical practice in 2002[3], has the molecular formula C18H15CIN2O2S, with a molecular weight of 358.84 g/mol[4].

Paracetamol, a non-opioid and antipyretic analgesic, has the molecular formula (C8H9NO2), with a molecular weight of 151.16 g/mol[4].

Some pharmaceutical formulations contain Etoricoxib only in 60 mg, 90 mg or 120 mg doses. In comparison, others use 60 mg/325

Received in 16/2/2023 & Accepted in 16/6/2023

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mg, 60 mg/500 mg, or 90 mg/325 mg of Etoricoxib/paracetamol, respectively, for higher efficacy and fewer side effects.

These combinations of Etoricoxib and paracetamol have been introduced into clinical practice as they show better clinical results and efficacy than the rest of the combinations; these combinations of Etoricoxib and paracetamol also outweigh the use of NSAIDs alone due to the synergistic action. Furthermore, these combinations offer faster efficacy in relieving pain with fewer side effects[4&7].

Etoricoxib has not been yet listed officially in any of the USP 43 and British pharmacopoeias at the time of conducting this research[5,6]. Furthermore, the studies that were conducted on Etoricoxib using HPTLC, UV, and HPLC are limited[7-10]. Irrespective whether the focus of these studies is on the assay of Etoricoxib alone or in combination with paracetamol, the analysis of Etoricoxib in combination with paracetamol takes a relatively long time in these studies, which leads to a waste in the solvents[7-9].

For the reasons above, the aim of this research is to develop a novel, economical method that uses cheaper solvents and leads to faster analysis that saves time and effort and avoids wasting solvents. To achieve this aim, this research has developed an analytical method that uses methanol and Ammonium acetate as a mobile phase since methanol is widely available, cheaper, and less toxic than Acetonitrile[11&12].

This study also aims to develop an accurate, rapid, and economically competitive analytical method that can assay the combination of Etoricoxib and paracetamol in bulk and tablet dosage form in a short time and be applicable in quality control labs and pharmaceutical industries.

MATERIALS AND DEVICES

A reference standard of Etoricoxib was obtained from Bahri Pharmaceutical Industries sourced from Kekule-pharma, India (purity: 99.6%). A reference standard of paracetamol was obtained from Bahri Pharmaceutical Industries sourced from Hebei-Jiheng, China (purity: 99.7%). Tablets containing 90 mg of Etoricoxib and 325mg of Paracetamol were obtained from Bahri laboratories as gift samples. HLPC-grade methanol, ammonium acetate (purity: 98%), and acetic acid (purity: 99.8%) were acquired from Panreac.

The chromatographic analysis was performed with the SHIMADZU HPLC system (Shimadzu, Japan) equipped with a photodiode array (PDA) detector, Sartorius sensitive analytical balance (with a sensitivity of 10-4mg), Transsonic digital ultrasonic cleaner, volumetric flasks, micropipettes and glassware of different volumes from Marienfeld Company, and Filters PVDF 0.45µm for HPLC obtained from Sartorius Stadium Biotech.

METHODS

Solutions preparation

The mobile phase is made of a mixture of methanol and ammonium acetate buffer solution (pH 3.5) at the ratio of 60:40 (methanol: ammonium acetate) filtered using HPLC filters.

Buffer solution preparation

To prepare 25 mmol of ammonium acetate, 1 gram of ammonium acetate was weighed, placed into a 500 ml beaker, dissolved and diluted up to the mark with HPLC water, and then glacial acetic acid was added to achieve the required pH. The resulting solution was filtered using HPLC filters.

Stock solution preparation (Etoricoxib and paracetamol)

A 90 mg of Etoricoxib standard and 325 mg of paracetamol standard were weighed and placed in a 100 ml volumetric flask, then diluent (mobile phase) was added and sonicated for 10 minutes. Then the volume is made up with diluent, and they are mixed together. Consequently, Etoricoxib concentration in the solution will be 0.9 mg/ml and paracetamol concentration will be 3.25 mg/ml.

Standard solution preparation

1 ml of stock solution of Etoricoxib and paracetamol was pipetted into a 100 ml volumetric flask. The solution was dilute up to the mark with the diluent (mobile phase) to the standard mark, which resulted in Etoricoxib

concentration of 9 µg/ml and paracetamol concentration of 32.5 µg/ml.

Sample solution preparation

20 tablets were weighed, and the average weight of each tablet was calculated. The tablets were then finely powdered. A weight that contains 90 mg of Etoricoxib and 325 mg of paracetamol was transferred into a 100 ml volumetric flask. Then, the mixture was dissolved in 100 ml of the mobile phase and sonicated for 20 minutes. Next, a 1 ml of the prepared solution was pipetted and a volume of 100 ml was made up with the diluent (mobile phase). Then, the solution was filtered using 0.45µ filters to get the final solution.

Method validation solutions preparation

All of the solutions were prepared using the diluent, which is a mixture of methanol and ammonium acetate with a ratio of 60:40. The stock solution was prepared with concentrations of 0.9 mg / ml and 3.25 mg / ml of Etoricoxib and paracetamol, respectively, and from it, the standard solution was prepared with respective concentrations of 9 µg/ml and 32.5 µg/ml. For linearity, five standard solutions of Etoricoxib and paracetamol were prepared corresponding to 80, 90, 100, 110, and 120%. The accuracy was investigated for three levels of Etoricoxib and paracetamol concentrations, namely, 80, 100, and 120% and then the mean recovery was calculated. Furthermore, the precision, repeatability, relative standard deviation %(RSD) were calculated, and the intermediate precision was established to determine the range of difference in results when the same method is applied by different analysts using the same equipment. In addition, the limit of detection (LOD) and limit of quantitation (LOQ) were calculated.

- LOQ and LOD were obtained using the regression analysis and calculated using the following formulas
- LOQ=10 σ/S
- LOD=3.3 σ/S

where,

σ denotes the standard deviation of intercepts of calibration curves;

S denotes the mean of slopes of the calibration curves.

To study the robustness: the flow rate, mobile phase ratio, temperature, pH and wavelength were adjusted individually while the rest of the conditions remained the same as mentioned before in the chromatographic conditions.

RESULTS AND DISCUSSION

Results

Method development and optimization

First, a spectrum scan was conducted between 200 and 400 nm wavelengths by spectrophotometer to choose the most appropriate wavelength for the measurement. Consequently, a 245 nm wavelength was chosen as both compounds showed good response at this wavelength **(Fig 1A, Fig 1B)**.

Acetonitrile was excluded from the mobile phase as mentioned earlier and methanol was used instead within the mobile phase that consists of methanol and ammonium acetate. This mobile phase, which was not previously studied in the literature, has achieved better retention time, so it was studied under different combination ratios and at different pH to obtain the best symmetrical sharp peak and the lowest possible retention time. More specifically, the combination ratios 50:50, 80:20, 60:40 and pH = 6, 4.7 and 3.7 were investigated and have resulted in either long retention times or asymmetrical peaks. On the other hand, the combined rate of 60:40 of methanol and ammonium acetate, respectively, with pH = 3.5 showed sharp symmetrical peaks with complete separation and with retention times of 2.493 and 3.64 min for paracetamol and Etoricoxib, respectively. It also showed tailing factors of 1.24 and 1.12, theoretical plate numbers of 2948 and 3747 for paracetamol and Etoricoxib, respectively, with a resolution factor of R = 5.464 > 1.5. Thus all parameters were found to be within the limits. **Fig. 2** depicts a chromatogram of a standard solution of Etoricoxib and paracetamol.

Therefore, the optimal chromatographic conditions obtained are

- Stationary phase, C18 (150×4.6) mm 5µm
- Mobile phase, 60% Methanol and 40% Ammonium acetate with pH = 3.5
- Flow rate of 0.7 ml/min
- Temperature of 35º C

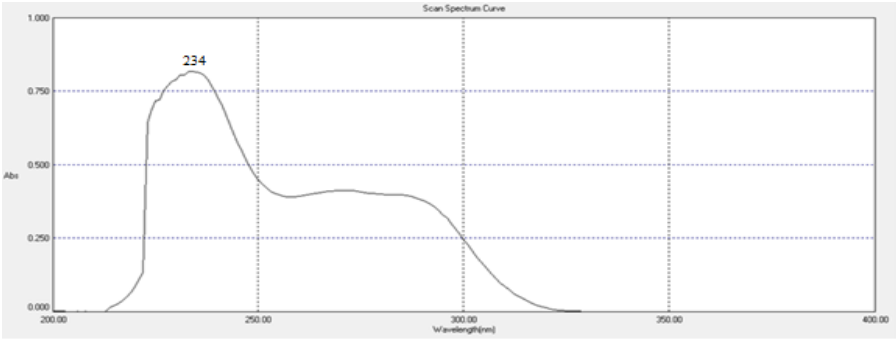

Fig. 1A: Etoricoxib UV-spectrum.

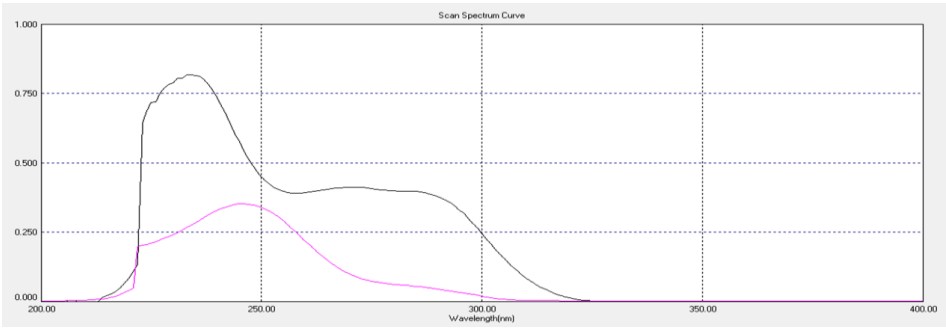

Fig. 1B: UV overlay spectrum of Etoricoxib and Paracetamol (Etoricoxib—In black; Paracetamol—In red).

Method Validation

The proposed method is validated based on the USP guideline for analytical parameters such as linearity, precision (repeatability and intermediate precision), accuracy, selectivity, robustness, LOD, and LOQ.

System suitability

Five replicates of working standard solution were injected into the HPLC system. The system suitability parameters of retention time, resolution factor, theoretical plate count, tailing factor, and relative standard deviations were evaluated.

The %RSD of paracetamol and Etoricoxib were 0.53% and 0.79% (both less than 2%), respectively. **Table 1** lists some of the parameters of the system suitability.

Table 1: System suitability results for paracetamol and Etoricoxib respectively.

Standard NO	Resolution	Plates	Retention time	Area	Asymmetry	Paracetamol	
1	5.464	2910.9	2.485	4654513	1.24		
2	5.454	2916.5	2.484	4648119	1.24		
3	5.509	3053.4	2.491	4647182	1.24	**Average**	4661602
4	5.460	2906.2	2.482	4651906	1.25	**SD**	25154.13
5	5.468	2948.9	2.493	4706289	1.25	**RSD**	0.539

Standard NO	Resolution	Plates	Retention time	Area	Asymmetry	Etoricoxib	
1	5.464	3747.9	3.636	732242	1.121		
2	5.454	3778.8	3.633	739211	1.126		
3	5.509	3763.8	3.639	737485	1.120	**Average**	739269.4
4	5.460	3796.9	3.631	738825	1.124	**SD**	5906.16
5	5.468	3828.8	3.642	748584	1.120	**RSD**	0.798

Linearity

To determine the linearity of the proposed method, five standard solutions were prepared with concentrations of 80%, 90%, 100%, 110%, and 120%. These solutions were injected into the system and concentration versus peak area plots were made to find the correlation coefficient (0.9994, 0.9991). The corresponding linear regression equations were calculated as Y=126509 x+545711 and Y=82770 x_11763 of paracetamol and Etoricoxib, respectively, as illustrated in **Fig.s 3a and 3b and Table 2**.

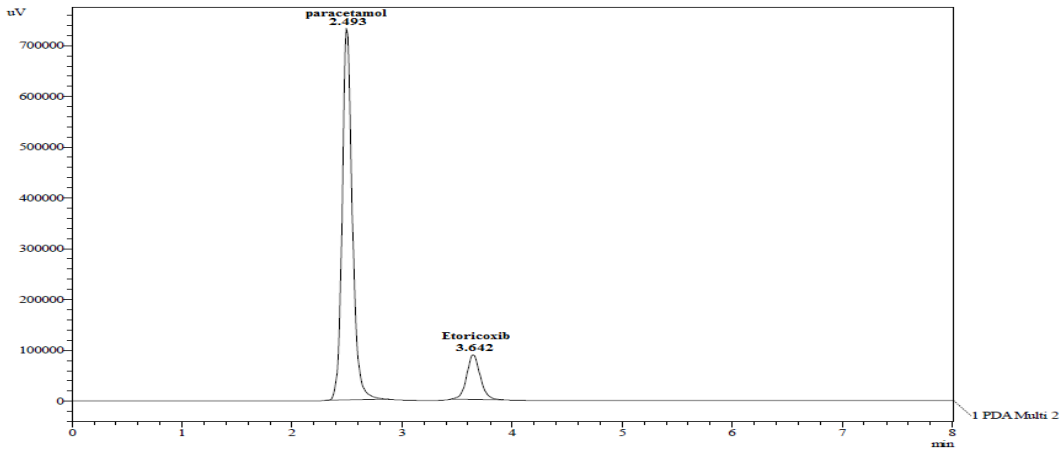

Fig. 2: A chromatogram of a standard solution of Etoricoxib and paracetamol.

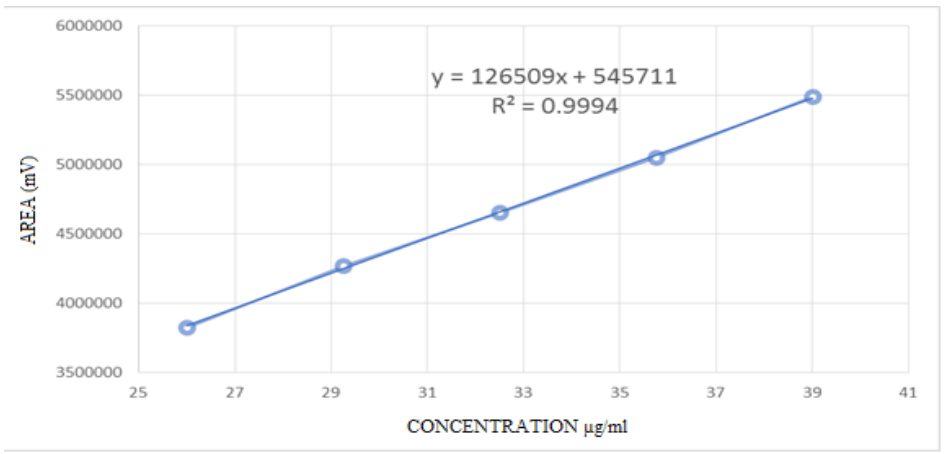

Fig. 3A: Linear regression equation of paracetamol.

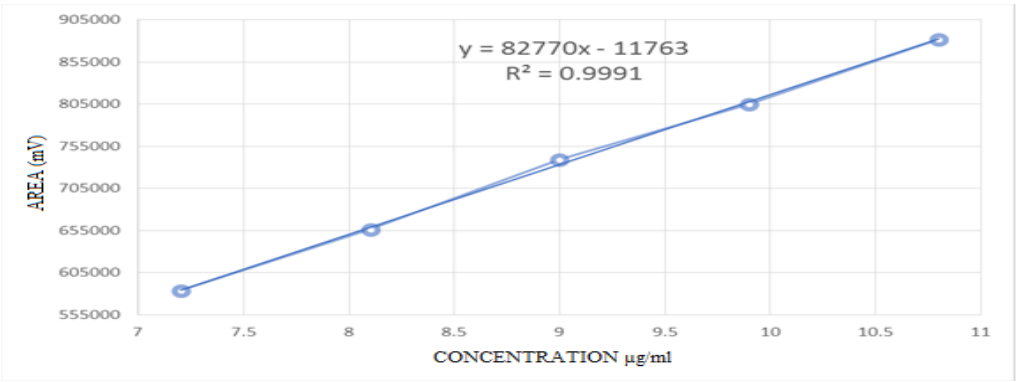

Fig. 3B: Linear regression equation of Etoricoxib.

Table 2: Linearity results for Paracetamol and Etoricoxib respectively.

Concentration		Area	Paracetamol \Linearity	
NO	µg ml^{-1}			
1	26	3824589		
2	29.25	4268059		
3	32.5	4654523		
4	35.75	5049371	R^2	0.9994
5	39	5489702	Y=126509x+545711	

Concentration		Area	Etoricoxib /Linearity	
NO	µg ml^{-1}			
1	7.2	583825		
2	8.1	656048		
3	9	739211		
4	9.9	804834	R^2	0.9991
5	10.8	881895	Y=82770x-11763	

Accuracy

Three recovery values of each of the sample solutions with 80%, 100% and 120% concentration were recorded and the average recovery was calculated as 99.98 % and 99.35% for paracetamol and Etoricoxib, respectively. **Table 3** shows the results of the accuracy test.

Precision

It includes repeatability and intermediate precision.

a. Repeatability

The percentage amount of 9 sample solutions of paracetamol and Etoricoxib was calculated, and the average was 100.0% and 99.45% with %RSD of 1.41% and 0.54% for paracetamol and Etoricoxib, respectively, as illustrated in **Table 4**.

Table 3: Accuracy results for Paracetamol and Etoricoxib respectively.

Amount added (µg ml^{-1})		Amount found (µg ml^{-1})	Recovery %		
Sample					
1	26	26.48	101.8		
2	26	26.5	101.9		
3	26	26.49	101.88		
4	32.5	32.43	99.78		
5	32.5	32.3	99.38		
6	32.5	32.40	99.69		
7	39	38.27	98.17		
8	39	38.34	98.30	**%RSD**	1.60
9	39	38.28	98.15	**Average**	99.98

Amount added (µg ml^{-1})		Amount found (µg ml^{-1}	Recovery %		
sample					
1	7.2	7.11	98.75		
2	7.2	7.143	99.20		
3	7.2	7.146	99.25		
4	9	8.964	99.6		
5	9	8.892	98.8		
6	9	9.108	101.2		
7	10.8	10.67	98.8		
8	10.8	10.719	99.25	%**RSD**	0.67
9	10.8	10.728	99.33	**Average**	99.35

Table 4: Repeatability results for Paracetamol and Etoricoxib respectively.

Sample NO	Concentration		Area	Practical concentration	percentage amount %		
	%	µg ml^{-1}		%			
1	80	26	3801233	81.54	101.92		
2	80	26	3811009	81.75	102.09		
3	80	26	3735007	80.12	100.15		
4	100	32.5	4699001	100.80	100.80		
5	100	32.5	4626015	99.23	99.23		
6	100	32.5	4624145	99.19	99.19		
7	120	39	5499071	117.96	98.30	**Average**	100.00
8	120	39	5599801	119.98	99.91		
9	120	39	5489826	117.766	98.13	**%RSD**	1.41

Sample NO	Concentration		Area	Practical concentration	percentage amount %		
	%	µg ml^{-1}		%			
1	80	7.2	585144	79.15	98.93		
2	80	7.2	587784	79.50	99.38		
3	80	7.2	587004	79.40	99.25		
4	100	9	743677	100.59	100.59		
5	100	9	736028	99.56	99.56		
6	100	9	731643	98.83	98.83		
7	120	10.8	876953	118.62	98.85	**Average**	99.45
8	120	10.8	880682	119.12	99.27	**SD**	0.53
9	120	10.8	882895	119.42	99.52	**%RSD**	0.542

b. Intermediate precision

The percentage amount of 9 sample solutions of paracetamol and Etoricoxib was calculated by different analysts using the same equipment, and the average was calculated as 99.95% and 99.58% with %RSD of 1.50% and 0.57% for paracetamol and Etoricoxib, respectively, as illustrated in Table 5.

Selectivity

Three percentage amount values of the sample solutions with 100% concentration were recorded and the average was calculated as 100.30% and 99.93% for paracetamol and Etoricoxib, respectively. **Table 6** shows the results of the selectivity test. The excipient sample, which contains (magnesium stearate, microcrystalline cellulose, crospovidone, PVP90, talc, HPMC.606, titanium dioxide), showed no interaction with the drugs' peaks of the effective material

Table 5: Intermediate precision results for paracetamol and Etoricoxib respectively.

Sample NO	Concentration		Area	Practical concentration	percentage amount%	Analyst		
	%	µg ml^{-1}		%				
1	80	26	3804101	81.60	102.00	A		
2	80	26	3810230	81.73	102.01	A		
3	80	26	3784589	81.18	101.48	A		
4	100	32.5	4654523	99.84	99.84	B		
5	100	32.5	4646119	99.66	99.66	B		
6	100	32.5	4647192	99.69	99.69	B		
7	120	39	5499446	117.97	98.31	C	**Average**	99.95
8	120	39	5498071	117.94	98.28	C	**SD**	1.5
9	120	39	5489702	117.76	98.13	C	**%RSD**	1.5

Sample NO	Concentration		Area	Practical concentration	percentage amount%	Analyst		
	%	µg ml^{-1}		%				
1	80	7.2	585245	79.16	98.95	A		
2	80	7.2	587664	79.49	99.36	A		
3	80	7.2	589804	79.78	99.72	A		
4	100	9	743567	100.58	100.58	B		
5	100	9	737128	99.57	99.57	B		
6	100	9	730633	98.83	98.83	B		
7	120	10.8	889963	120.38	100.32	C	**Average**	99.58
8	120	10.8	881683	119.26	99.38	C	**SD**	0.570
9	120	10.8	882994	119.44	99.53	C	**%RSD**	0.573

Table 6: Selectivity results for Paracetamol and Etoricoxib respectively.

Sample NO	Concentration		Area	percentage amount%		
	%	µg ml^{-1}				
Excipient	0	0	0	0		
1	100	32.5	4699001	100.80		
2	100	32.5	4702112	100.86		
3	100	32.5	4626015	99.23	**Average**	100.30

Sample NO	Concentration		Area	percentage amount %		
	%	µg ml^{-1}				
Excipient	0	0	0	0		
1	100	9	739243	99.99		
2	100	9	738482	99.89		
3	100	9	738724	99.92	**Average**	99.93

Robustness

The flow rate was incremented and decremented by 0.1 ml /min. Other parameters were conducted like mobile phase ratio (±1%), pH (±0.2), wavelength (±1), and temperature (±3°C). The corresponding responses were recorded as listed in **Table 7**.

Table 7: Robustness results for Paracetamol and Etoricoxib respectively.

Flow rate Paracetamol	0.6ml/min	0.7ml/min	0.8 ml/min
Standard NO	Area	Area	Area
1	5768894	4872037	4097155
2	5784054	4844958	4097864
3	5770533	4840114	4087564
4	5773360	4844883	4087703
5	5728763	4842684	4086141
Average	5765120.8	4848935.2	4091285.4
SD	21164.64651	13065.43798	5720.083942
%RSD	0.36	0.26	0.13
Sample	5828763	4894887	4096241
Percentage	101.1	100.9	100.1
RT Std	2.90	2.50	2.19
RT Sample	2.90	2.50	2.18
Relative RT	1	1	0.99

Flow rate Etoricoxib	0.6ml/min	0.7ml/min	0.8 ml/min
Standard NO	Area	Area	Area
1	883190	756376	641740
2	881248	752669	640218
3	881738	750041	637575
4	877767	745161	634899
5	892804	750505	637300
Average	883349.4	750950.4	638346.4
SD	5647.799377	4090.637579	2673.667201
%RSD	0.639361885	0.544728064	0.418842685
Sample	898792	745161	643948
Percentage	101.74	99.22	100.87
RT Std	4.26	3.66	3.20
RT Sample	4.26	3.66	3.20
Relative RT	1	1	1

Wavelength Paracetamol	244 nm	245 nm	246 nm
1	4876981	4872037	4873273
2	4853254	4844958	4851000
3	4835861	4840114	4814566
4	4849118	4844883	4843631
5	4838544	4842684	4819607
average	4850751.587	4848935.2	4840415.104
SD	16337.44639	13065.43798	23995.59456
%RSD	0.337	0.269449631	0.49573423
sample	4892024	4894887	4902334.081
percentage	100.85	100.95	101.08
RT standard	2.501	2.501	2.502
RT sample	2.500	2.501	2.501
Relative RT	1	1	1

Wavelength Etoricoxib	244 nm	245 nm	246 nm
1	757542	756376	756487
2	753405	752669	752780
3	750605	750041	748130
4	745001	745161	744078
5	749564	750505	756984
average	751223.3904	750950.4	751691.8396
SD	4651.256266	4090.637579	5541.588987
%RSD	0.61915754	0.544728064	0.737215531
sample	749807	745161	744226
percentage	99.81	99.23	99.01
RT standard	3.661	3.662	3.663
RT sample	3.661	3.660	3.660
Relative RT	1	1	1

pH Etoricoxib	pH 3.3	pH 3.5	pH 3.7
1	750767	756376	761107
2	747909	752669	753412
3	745272	750041	751809
4	743560	745161	750703
5	742636	750505	753280
Average	746028.7241	750950.4	754062.0268
SD	3322.903523	4090.637579	4093.307616
%RSD	0.445412276	0.544728064	0.542834339
Sample	741275	745161	747913
Percentage	99.36	99.23	99.18
RT standard	3.651	3.660	3.688
RT sample	3.642	3.661	3.689
Relative RT	0.997	1	1

Mobile phase ratio Paracetamol	61M:39B	60M:40B	59M:41B
1	4863009	4872037	4883243
2	4840609	4844958	4859977
3	4827578	4840114	4854150
4	4841593	4844883	4854088
5	4834038	4842684	4855469
average	4841365.613	4848935.2	4861385.47
SD	13349.61927	13065.43798	12453.16417
%RSD	0.275	0.269	0.256
sample	4877324.145	4894887	4915201
percentage	100.74	100.95	100.11
RT standard	2.478	2.501	2.524
RT sample	2.479	2.500	2.525
Relative RT	1	1	1

Mobile phase ratio Paracetamol	61M:39B	60M:40B	59M:41B
1	755427	756376	763828
2	749904	752669	755452
3	747285	750041	754735
4	740107	745161	746254
5	742884	750505	758409
average	747121.3897	750950.4	755735.847
SD	5998.010842	4090.637579	6395.637042
%RSD	0.802816105	0.544728064	0.846279433
sample	742420	745161	752140
percentage	99.37	99.23	99.52
RT standard	3.655	3.660	3.696
RT sample	3.651	3.666	3.695
Relative RT	0.998	1	1

Temperature Paracetamol	32 °C	35 °C	38 °C
1	4890035	4872037	4849246
2	4856386	4844958	4814203
3	4886831	4840114	4831666
4	4880993	4844883	4827029
5	4873667	4842684	4773108
Average	4877582.38	4848935.2	4819050.344
SD	13387.14629	13065.43798	28586.82906
%RSD	0.274	0.269	0.593
Sample	4899657	4894887	4876915.184
Percentage	100.45	100.95	100.99
RT standard	2.522	2.500	2.483
RT sample	2.524	2.500	2.486
Relative RT	1	1	1

Temperature Paracetamol	32 °C	35 °C	38 °C
1	762821	756376	755427
2	759836	752669	750604
3	752780	750041	747214
4	749080	745161	739599
5	752947	750505	748415
Average	755492.6982	750950.4	748251.8655
SD	5646.634693	4090.637579	5765.874873
%RSD	0.747410889	0.544728064	0.770579418
Sample	749067	745161	740075
Percentage	99.15	99.23	98.88
RT standard	3.691	3.660	3.646
RT sample	3.693	3.661	3.647
Relative RT	1	1	1

LOD and LOQ

As mentioned earlier, those were calculated using LOQ=10 σ/S and LOD=3.3 σ/S.

The results showed that LOD and LOQ of paracetamol are 1.4 µg/ml and 4.3 µg/ml, respectively, and 0.52 µg/ml and 1.6µg/ml for Etoricoxib, respectively. This proves that the proposed method has good sensitivity and consequently, this method has managed to separate the combination of paracetamol and Etoricoxib with validation results that agree with the USP parameters.

Assay of marketed formulation

The Rp-HPLC method was used to conduct the analysis of the commercially-available formulations of Etoricoxib 90 mg, and Paracetamol 325 mg tablets. Out of these commercially-available formulations, six sample sets were prepared and tested. Etoricoxib's assay findings were discovered to be 100.42% with an %RSD of 0.78%, and paracetamol's results to be 99.5% with an %RSD of 1.02%. **Fig. 4** depicts a chromatogram of the tablet assay.

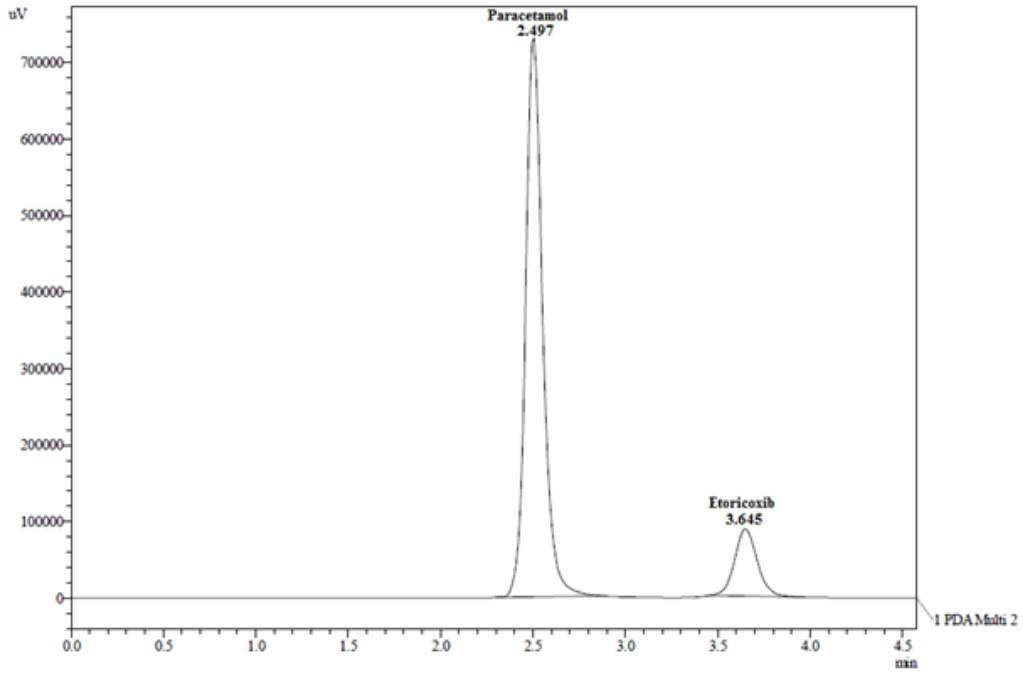

Fig. 4: A chromatogram of assay tablet.

Conclusion

A novel, accurate, rapid, and economically-competitive analytical method was developed and validated for the simultaneous estimation of Etoricoxib and paracetamol in bulk and pharmaceutical dosage form.

The method demonstrated excellent linearity with correlation coefficient values of more than 0.999 for both Etoricoxib and paracetamol. Precision and accuracy were appropriate within less than 2% RSD. Both Etoricoxib and paracetamol were well separated and eluted within less than 4 minutes, which makes this method rapid and simultaneously solvent-saver. Thus the method can be easily applied in quality control labs and pharmaceutical industries.

Acknowledgments

We would like to thank the college of Pharmacy, University of Damascus and Bahri company for providing us the opportunity to accomplish this work.

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Bull. Pharm. Sci., Assiut University, Vol. 46, Issue 2, 2023, pp.969-982.

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طريقة موثقة لفصل وتعيين الأتيروكسيب والباراسيتامول في المستحضرات الصيدلية المختلفة

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الأتيروكسيب كعقار مضاد للألتهاب يعمل عن طريق المنع الأختياري للسيكلواوكسيجينيز ٢ مما يجعله اكثر امانا للجهاز الهضمي مقارنة بمضادات الألتهاب الأخري.تناول هذا العقار مع الباراسيتامول يعطي فاعلية وامان اكثر وتعتبر هذا المخلوط شائع جدا في الصناعات الدوائية لذلك تطوير طريقة جديدة لتحليلهم المتزامن الكمي باستخدام الكروماتوجرافيا ذات الأداء العالي. الطريقة المقترحة تتضمن استخدام خليط من الميثانول و خلات الأمونيوم بنسبة ٦٠:٤٠ عند رقم هيدروجيني ٣ و نصف والكشف عند طول موجي ٢٤٥ نانومتر ، ووجد ان زمن الحفظ للأتيروكسيب والباراسيتامول ٢،٤٩ و ٣،٦٤ علي التوالي مع عامل دقة اكثر من ٢ . الطريقة المقترحة تضمن عدم التداخا من الأضافات المختلفة بالأقراص مما يجعلها صالحة جدا لمعامل ضمان الجودة في الصناعات الصيدلية بلأضافة الي كونها سريعة ودقيقة و اقتصادية.