activity=(mean number of implantations/mean number of corpora lutea×100).

Preliminary phytochemical studies revealed that the ethanol extract showed the presence of alkaloids, saponins, flavonoid glycosides, steroids and phenolic compounds[6]. The ethanol extract of *A. tagala* showed significant reduction in the number of corpora lutea and increase in the no of resorptions in comparison to the control. The extract showed 72% antifertility activity on oral administration of 100 mg/kg whereas a remarkable 100% antifertility activity resulted on the administration of 200 mg/kg as compared to the untreated control group (Table 1). All the data were expressed as mean±SD and subjected to students "t" test for statistical significance of satisfied probability level[8].

There has been a continuous search for the indigenous drugs that can prevent the pregnancy since high rate of population is the cause for the dire situation that world now confronting. The present investigation revealed that the plant showed a significant antifertility activity on female Wistar rats. Estrogen secretion by corpus luteum at early stages of pregnancy provides the nutrition for early embryo and prevents the early abortion by decreasing the contractility of the uterus[9]. The plant *A. tagala* has been reported to possess aristalochic acid that prevents pregnancy by antiestrogenic activity. The present study also provides a clue for antiestrogenic activity of *A. tagala*, which is predominantly due to the reduction in the number of corpora lutea.

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Spectrophotometric Estimation of Tranexamic Acid in Bulk and Pharmaceutical Dosage Form.

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Two, simple, accurate, rapid and sensitive methods have been developed for the estimation of tranexamic acid in pharmaceutical dosage forms. Method A is based on the oxidation of tranexamic acid with potassium permanganate in an alkaline medium giving green coloured chromogen, which shows maximum absorption at 620 nm while method B is based on condensation of the drug with p-dimethylaminobenzaldehyde in sulphuric acid to form yellow coloured species which shows maxi-

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mum absorption at 410 nm against reagent blank. In both the methods, Beer's law was obeyed in the concentration range of 10–80 μg/ml.

Tranexamic acid[1,2] is an antifibrinolytic agent used mainly in the treatment of prophylaxis of haemorrhage associated with excessive fibrinolysis. Chemically it is trans-4-(aminomethyl) cyclohexane carboxylic acid. British pharmacopoeia[3] describes a titrimetric method (non-aqueous) for the assay of raw material and its dosage form (tablet and injection). Literature survey revealed HPLC and spectrofluorimeteric methods[4-6] for the determination of this drug in pharmaceutical dosage forms.

The present work describes two simple colorimetric methods for the estimation of tranexamic acid in pharmaceutical dosage forms. Method A involves oxidation of tranexamic acid with potassium permanganate in alkaline medium to yield a green coloured species which shows maximum absorption at 620 nm against reagent blank. Method B is based on the condensation of the drug with p-dimethylaminobenzaldehyde in sulphuric acid to form a yellow coloured species which shows maximum absorption at 410 nm against reagent blank. A Systronics spectrophotometer 117 with 1 cm matched cuvettes was used for the measurement of absorbance. Solutions of potassium permanganate (0.05% w/v), sodium hydroxide (0.1N) and p-dimethylaminobenzaldehyde in 5% sulphuric acid (2.5%), (Loba Chemie, Mumbai) were freshly prepared in distilled water.

Standard solution of tranexamic acid was prepared by dissolving 100 mg in 100 ml and diluting 10 ml of this solution to 100 ml with distilled water (100 μg/ml). For the analysis of tranexamic acid in tablets, two different commercial brands of 500 mg strength (Tx, Ochoa, Xamic, Torrent) were taken. Twenty tablets of tranexamic acid were weighed and powdered in a glass mortar. Powder equivalent to 100 mg of tranexamic acid was accurately weighed and dissolved in distilled water to make 100 ml. The solution was then filtered and 1 ml of the filtrate was diluted to 100 ml with distilled water.

For the analysis of tranexamic acid in injection, two different commercial brands of 500 mg per 5 ml strength (Tx–Ochoa, Xamic–Torrent) were taken. One millilitre of the injection (equivalent to 100 mg of tranexamic acid) was volumetrically transferred into a 100 ml volumetric flask and diluted to volume with distilled water. One millilitre of this solution was volumetrically transferred into a 100 ml volumetric flask, diluted to volume with distilled water and mixed.

In method A, aliquots of 0.1 ml to 0.8 ml portion of standard solution were transferred to a series of 10 ml corning test tubes. To each test tube 2 ml of 0.05% potassium permanganate solution was added and shaken for 20 min. One millilitre of 0.1 N sodium hydroxide was successively added, shaken well and the volume in each test tube was adjusted to 10 ml with distilled water. The absorbance of the solution in each test tube was measured at 620 nm against reagent blank prepared in the same manner without the addition of the drug and calibration curve was plotted. Similarly the absorbance of sample solution was measured and amount of tranexamic acid was determined by referring to the calibration curve.

In method B, aliquots of 0.1 ml to 0.8 ml portion of standard solution were transferred to a series of 10 ml corning test tubes. To each test tube 5 ml of p-dimethylaminobenzaldehyde in 5% sulphuric acid were added. The solution was kept for 5 min to complete the reaction and volume in each test tube was adjusted to 10 ml with distilled water. The absorbance of the solution in each test tube was measured at 410 nm against reagent blank prepared in the same manner without the addition of the drug and the calibration curve was plotted. Similarly the absorbance of sample solution was measured and the amount of tranexamic acid was determined by referring to the calibration curve.

To test the accuracy and reproducibility of the proposed method, recovery experiments were carried out by adding known amounts of the drug to the preanalysed formulation and reanalyzing the mixture by proposed method. The results are shown in Table 1. Stability study of the chromogen was carried out by measuring the absorbance values at time intervals of 10 min to 2 h and it was found to be stable for 1.5 h for both methods. The optical characteristics such as absorption maxima, Beer's law limits, correlation coefficient (r), slope (m), y-intercept (c), molar absorptivity and Sandell's sensitivity calculated from 5 replicate reading are incorporated in Table 2. The molar absorptivity and Sandell's sensitivity values show the sensitivity of both the methods. The analysis results of marketed formulations are in good agreement with the official methods. The reproducibility, repeatability and accuracy of these methods were found to be good, which is evident by low standard deviation values (0.61 for method A and 0.71 for method B). The

TABLE 1: ANALYSIS DATA OF TABLET / INJECTION FORMULATION.

Sample (Tablet/injection)	Labeled amount (mg)	*Amount obtained (mg)			Percent recovery by the proposed method	
		Official method	Proposed method±SD			
			A	B	A	B
Tablet 1 Tx (Ochoa)	500	499.4	499.3 ±0.60	499.6 ±0.68	99.98	100.0
Tablet 2 Xamic (Torrent)	500	499.5	499.7 ±0.62	499.9 ±0.74	99.96	99.96
Injection 1 Tx (Ochoa)	500	499.6	500.0 ±0.68	499.1 ±0.70	99.92	100.1
Injection 2 Xamic (Torrent)	500	500.0	500.2 ±0.62	500.0 ±0.72	99.95	99.99

*Mean of five determinations. SD stands for standard deviation (n=5)

percentage recovery obtained (100.3-100.6 for method A and 99.9-100.3 for method B) indicates non-interference from the common excipients including lactose used in the formulation. Thus the developed methods are simple, sensitive, accurate and precise and can be successfully applied for the routine estimation of tranexamic acid in pharmaceutical dosage forms.

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TABLE 2: OPTICAL CHARACTERISTICS AND PRECISION

Observation	Method A	Method B
Absorption maxima (nm)	620	410
Beer's law limit (µg/ml)	10-60	10-60
Correlation coefficient	0.9999	0.9999
Molar extinction coefficient (l/mol.cm)	1.670×10^4	1.294×10^4
Sandell's sensitivity (µg/cm²/0.001 Absorbance unit)	2.343×10^{-2}	2.059×10^{-2}
Regression equation (y=mx+c)		
Slope (m)	0.03388	0.05029
Intercept (c)	0.0035	0.000228
% Range of error	±0.4938	±0.5648
% Relative Standard Deviation		
For tablets	±0.61	±0.71
For injection	±0.65	±0.71

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Formulation and Physico-chemical Evaluation of Polystyrene Nanoparticles Containing Cefotaxime Sodium

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Polystyrene nanoparticles containing cefotaxime were prepared by emulsion polymerization in continuous aqueous phase. Scanning electron microphotograph showed that the morphological structures of the nanoparticles are discrete, spherical and uniform in size. The drug content in the polystyrene nanoparticles were considerably increased proportionately with increasing polymer concentration. The infrared spectroscopic analysis revealed that there was no significant chemical interaction between the polymer and the drug. The *in vitro* release studies carried out across the artificial membrane indicated that the release of the drug from the nanoparticles followed zero order kinetics.

Nanoparticles are novel drug delivery systems that can successfully deliver a drug at optimum dose at the required site of action. This polymeric colloidal solid particles posses a size range of 1-1000 nm and have been extensively studied[1] both as targeted and as sustained drug delivery system. Nanoparticles are classified into two main types namely nanospheres and nanocapsules. Nanospheres are polymeric matrices in which the drug is dissolved or dispersed while the nanocapsules are of polymer wall entrapping an oily core in which the drug is dissolved[2]. It is a potential drug delivery system for various classes of drugs that include anticancer, antimalarial, antiinflammatory[3], antiviral, hormones and antibiotics[4,5] and many were reported to have an increased therapeutic efficacy.

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