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To Evaluate the Absorption, Elimination Pattern of Ricinus Communis, Using Rabbit as A Tool

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Abstract:
Pharmacokinetics is a study of movement of a drug in our body. Usually a modern drug will consists of the ingredient and excipients. It is relatively easy to trace the pharmacokinetics of the modern drug. In case of herbal medicines, usually most of the over the counter products are polyherbal. There is no component clearly said to be the active principle responsible for the dedicated medicinal effect. Hence one needs to establish some phytochemical markers for the identification of the herb(s) in the blood, which can be used to trace the fate of the drug in the living system. This will help us to establish the absorption elimination process of the herb. The markers thus obtained need not be the active principle or constituent of the drug. This will help to decide the dosage regime and the therapeutic window of the drug. The present work was undertaken with an objective to establish a phytochemical marker for the detection of *Ricinus communis* in the blood of rabbits and to establish the pharmacokinetics of the herb. One component was identified from *Ricinus communis* in the plasma of the rabbits fed with the leaf powder of *Ricinus comunis* as a dose. The phytochemical could be detected using HPLC at R_t 5.707 minutes for *Ricinus communis*. This phytochemical was used to establish the pharmacokinetics of leaf powder of *Ricinus communis*.

Keywords: Markers, *Ricinus communis*, RP-HPLC, Pharmacokinetics.

Introduction

Pharmacokinetics is the science of quantitative actions between a biological organism and pharmacology within it. The word pharmacokinetic was first introduced by Dust in his book "Der Blustpiegel" (Blood vessel) (M.Gaibaldi, 1991). In 1933, Gehlen expressed his idea that intravenously administered drugs follow the function of time. He found out that T_{max} is independent of the dose (H.M. Abdou, 1989). In 1937, Teorell made one of the most important contributions to the field of pharmacokinetics with his famous manuscript "Kinetic of distribution" of substances administered to the body (H.M.Abdou 1993). In 1949, Druckery and Kupfmuller's monograph "Dosis and Wikung" (Dose and its effect) stated a complete theory of pharmacokinetics and its modern aspect like effect kinetics, system kinetics using various electrical analog circuits to visualize time courses H.M.Abdou 1989). New drug cannot be a subject of licencing application nor be put in the market, unless pharmacokinetic data are available. Pharmacokinetics is one of the most important and essential foundations of clinical pharmacokinetics. Various methods for the estimation of a specific component in biological fluid like Liquid chromatography, Gas chromatography, High pressure Liquid Chromatography are used.

Herbal medicine finds vast application in clinical studies. It is necessary to device a series of experiments which are capable of determining the bioavailability of herbal medicines in biological fluids. Drug concentrations are determined in the systemic circulation in order to describe their kinetics within the

body. The major biological fluid (matrices) analysed are blood, plasma, serum, tears, cerebrospinal fluid (CSF), saliva and urine. Blood, plasma, serum and urine are most commonly investigated. Saliva has been used as a potential substitute for plasma because it can be obtained by non-invasive techniques and concentration of the drug in saliva can be correlated to that in plasma. Objective of analytical method development is to develop such a method that will detect one or more relative marker compounds, which will be helpful in invivo study.

Materials and method

Ricinus communis (Linn), of family Euphorbiaceae, have been used in traditional medicine such as abdominal pain, arthritis, backache, sciatica constipation, gall bladder pain etc., (S.Khan *et al*, 2017). Leaves of *Ricinus communis were* collected from Thane district of Maharashtra. The leaves were thoroughly washed with water to remove dust and other extraneous matter, the excess of water was absorbed by spreading the plant material over filter paper for three days in shade away from sunlight. The filter paper was replaced daily. Leaves were then placed in a pre-set oven at 45±5°C. The plant material was allowed to dry for four days. Immediately after drying, it was powdered using an electric mixer grinder and sieved through a BSS mesh NO 85 sieve. The sieved powdered was stored in commercially available airtight polythene container with date and time of collection. This powdered plant material was used for further work.

Animal Model: - Animals used for the investigation were New Zealand albino rabbits, ranging between 2± 0.2 kg. The animals were subjected to acclimatization, for which they were kept in a separate quarantine room for seven days. The animals were provided with drinking water *ad libitum* and were fed on commercially available feed.

Pharmacokinetic study was carried out using HPLC method. HPLC system used in the present study was JASCO PU-1580 with JASCO MD -1410 PDA detector. The column used in the present study was COSMOSIL 5C-18-MS, SIZE 4.6X150 mm. Manufacture No K01016.

Various mobile phases were tried like Methanol, Acetonitrile, and Distilled water. However best separation of *Ricinus communis* leaf marker was found in ACN: D/W (0.5:95) + (100 mg of Hexone sulfonic acid/ 100 ml of mobile phase). The Rt of marker was 5.707.

Blood was removed from the rabbit's ear, before administering the oral dose. Blood was centrifuged at 4500 rpm for 15 minutes to separate plasma from the blood.

Oral dose of 1g/kg body weight was given to the same rabbit. $3cm^3$ of blood was removed in sterile, heparinised appendorff tube at the intervals of 0.50, 1.00, 2.0, 4.0, 12.0, 24.0 hours of post dose. The appendorff tubes were centrifuged at 4500 rpm for 15 minutes, and $0.5cm^3$ of plasma was separated in $10.00cm^3$ clean dry stoppered test tubes. 10.00 cm^3 of dichloromethane (DCM) was added to every test tube and the test tubes were shaken for 10 minutes. The test tubes were centrifuged for 10 minutes at 400 rpm. Supernatant aqueous layer was removed carefully, using hypodermic syringe. 8.00 cm^3 of Dichloromethane methane was transferred to a low volume evaporating tubes. After evaporation, the residue was reconstituted in 500µL of mobile phase. 20µl of reconstituted extract was injected in HPLC system.

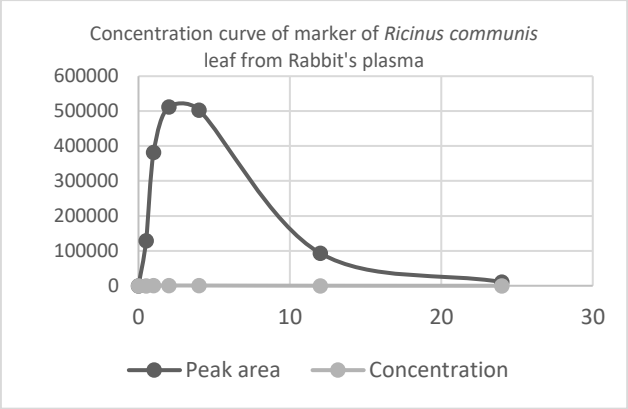
Observations

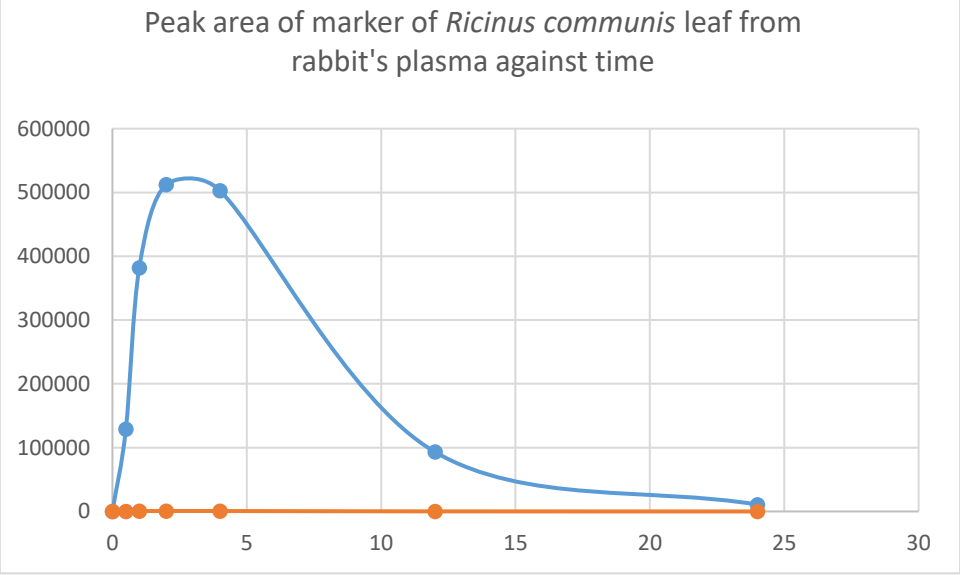
Ricinus communis leaf marker was not observed at 0.00 hours; however, its concentration in plasma increased gradually and reached its maximum at 2.00 hours post dose. It then decreased gradually thereafter. At 24hours, the concentration was found out to be the least.

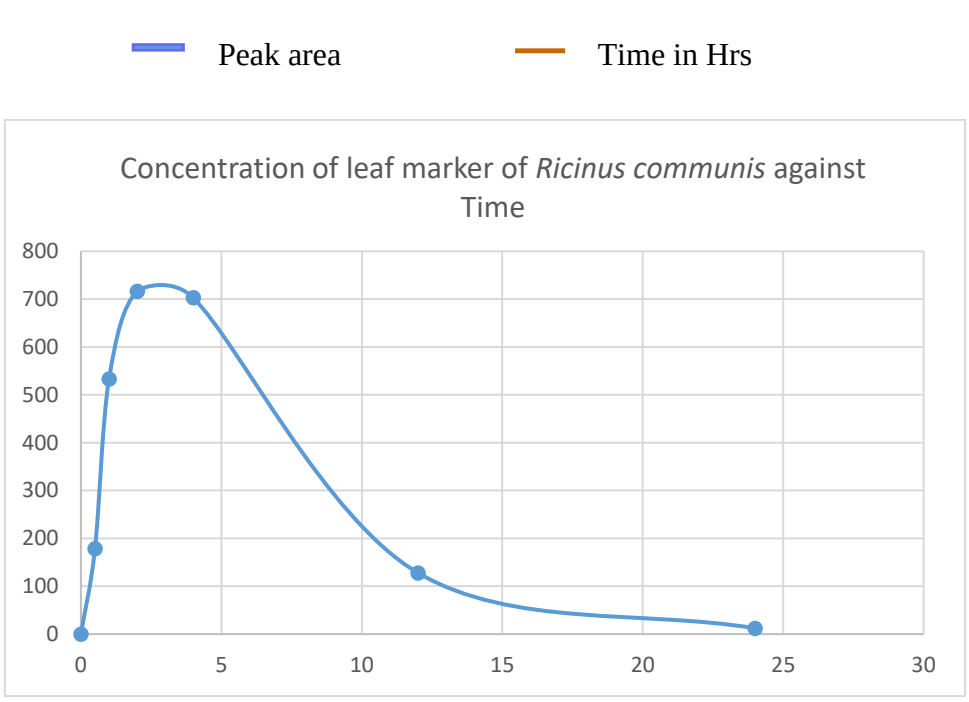
Conclusion

The pharmacokinetic study of *Ricinus communis* leaf showed a typical absorption elimination pattern. This study demonstrated the probability of developing the methods to detect markers of other plants in biological matrix using similar approach.

Sampling hours	Peak area	Concentration
0	0	0
0.5	129131	178.21
1	381995	533
2	512451	718.04
4	502938	702.7
12	93293	127.93
24	10794	12.17







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