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Experimental evaluation on analgesic activity of *Erandamoola (Ricinus communis)* collected in three different seasons wsr to *Dravya Samgrahana Kaala*

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ABSTRACT

About: *Dravya samgrahana kaala* is an important scientific documentation mentioned in Ayurveda where there will be change in activity and phytochemical profile of plants in different seasons. *Erandamoola* (*Ricinus communis*) is an important medicinal plant where roots are particularly indicated as analgesic. As per Dravya samgrahana vidhi roots are to be collected in Hemanth-Shishira or Greeshma rutu or Pravarat rutu. Hence with this background study has been planned to evaluate analgesic activity of the *Erandamoola* (*Ricinus cumunis*) collected in Greeshma (EMG) and Pravrutritu (EMP) and Shishiraritu (EMS) using Eddy's Hot plate method, in swiss albino mice. **Materials and Methods:** Roots of matured plant will be collected in three different seasons, shade dried, powdered and used for the study. Swiss Albino mice were randomly grouped into 3 groups of six animals each. Group I served as control, Group II serve as standard with administration of Tramadol whereas Group III (EMG), Group IV (EMP) and Group V (EMS) serve as the test group with administration of 200 mg/kg body weight (Erandmoola collected in Greeshma (EMG), Pravrut ritu (EMP) and Shishira ritu (EMS) respectively. **Results:** Erandamoola collected in greeshma and pravrut ritus show almost similar pain threshold with a slight increase in values than drug collected in greeshma ritu. **Conclusion:** Thus Erandamoola (Ricinus communis) can be efficiently used as an analgesic, simulatneously season or Samgrahana kaala is having a definite role on drug activity.

Keywords: *Dravya samgrahana kaala*, *Erandamoola (Ricinus communis)*, Analgesic, Hot plate.

INTRODUCTION

Ayurveda states the importance of good collection practice to achieve best therapeutic outcome of the drug. Maturity, appearance, smell, colour, place of collection, season of collection are few major criteria decide about efficacy of herbal drug [1]. Dravya samgrahana (collection of herbal drugs) entirely decides the efficacy of therapeutics. Different season are indicated for collecting different parts of the plants [2]. The plant shows the variation in its physical and chemical properties as it grows, and also seasonally [3]. Hence it is essential to collect the plant or part of the plant as medicine when it is rich in its phytoconstituents.

Eranda (*Ricinus comunis),* the roots of which are widely used as analgesic and spermatogenic as per classics of ayurveda [4]. As per classical references, roots are to be collected in either Greeshma Ritu or Shishira Ritu. Nighantu suggests it can be collected in Pravrut Ritu [5].

Hence with all these backgrounds present study designed to carry out experimental evaluation of analgesic property on Eranda moola (*Ricinus communis)* collected in three different seasons (*Pravrut Ritu* (EMP), *Greeshma rutu* (EMG) and *Shishira Ritu* (EMS)) in Swiss albino Mice.

In the body, there are a moderate number of antioxidant protection machinery against free radicals and ROS. Chelation techniques have also been utilized in the mitigation of cadmium-induced toxicity [5]. Numerous thiol-containing compounds have been exploited as treatments for heavy metal intoxications due to their ability to scavenge free radicals, reinstate cellular thiol pools, and form steady complexes with heavy metals [6]. However, due to the possible side effects and adverse health risks linked to the chelation therapy and synthetic thiol-containing compounds in the treatment of cadmium toxicity, natural exogenous antioxidants from dietary sources in form of medicinal plants have been encouraged. Reports indicate that some of these medicinal plants possess more beneficial pharmacological activities than their synthetic equivalents in addition to being harmless, adequate, cheaper, culturally acceptable and appropriate for treatment of heavy metal disorders [7]. Also, several medicinal plants such as turmeric, *Sutherland frutescens*, *Carpobrotus edulis*, *crossing guttata* and their isolated bioactive compounds/molecules are well known internationally for their potency [8-11].

MATERIALS AND METHODS

Plant material

The *roots of Erandamoola (Ricinus comunis)* were collected from natural habitat during the Pravrut Ritu (EMP)(May-June), Greeshma rutu (EMG) (April- May) and Shishira Ritu (EMS) (December-January) shade dried separately, extract was prepared by Soxhlet extraction with ethanol. The drug extract was concentrated using rotary evaporator and suspended in 1% tween 80. This extract was used for oral administration while experimentation [6].

METHODOLOGY

Animal selection

Healthy Swiss albino mice were taken from animal house attached to SDM center for Research in Ayurveda and Allied sciences, Udupi. The experimental protocol was approved by IAEC with approval no SDMCRA/IAEC/ 7/01/2019. The animals were fed with normal diet, water and libitum and cholesterol solution throughout the study. They were acclimatized in the laboratory condition for one week prior to the experiment [7].

Preparation and administration of doses

A dose of 200mg/kg body weight was chosen as per the previous work. All the doses were prepared in distilled water using 5% Tween 80 solution as suspending agent and administered orally [8]. In all cases, the concentrations were prepared in 1 ml/100g of body weight. The test substances were administered in a single dose using a gastric intubation tube after fasting for 3 to 4 h.

Analgesic activity using Hot plate test [9]

Swiss Albino mice having weights 18-30 g were selected and maintained at standard laboratory conditions. These were randomly grouped into 3 groups of six animals each. Group I served as control. Group II serve as standard with administration of Tramadol at 5 mg/kg body weight. Group III (EMG), Group IV (EMP) and Group V(EMS) serve as the test group with administration of 200 mg/kg body weight (Erandmoola collected in Greeshma (EMG), Pravrut ritu (EMP) and Shishira ritu (EMS) respectively. The delay in response time (Jumping and hind paw licking response) of animals when placed on the hot plate which was maintained at 55 ± 1ºC was recorded at 0,10,20, 30,40 and 60 min. The percentage increase in reaction time was calculated. Percentage protection against thermal pain was calculated by applying the formula: % protection against thermal pain = (Ta – Tb) x 100/ Tb Where, Ta – Mean reaction time of test and Tb – Mean reaction time of control.

Statistical Analysis

The data were expressed as Mean ± SEM. Results were analyzed statistically by one-way analysis of variance (ANOVA) followed by Dunnet and Tukey's test. P value <0.05 was regarded as statistically significant [10].

RESULTS

Analgesic activity of *Erandamoola* (*Ricinus cumunis*)

The results of the analgesic activity of the *Erandamoola* (*Ricinus cumunis*) collected in Greeshma (EMG) and Pravrutritu (EMP) and Shishiraritu (EMS) using Eddy's Hot plate method, were documented in master charts and presented in the table and statistical analysis was carried to observe the efficacy and to compare the effect.

Table 1: Effect of *Erandamoola (Ricinus comunis)* on analgesic activity at initial stage

Rat No	Control	Standard	EMG	EMP	EMS
1	6.16	8.12	8.56	5.99	6.58
2	6.04	15.21	11.2	14.5	15.21
3	4.06	20.39	11.25	10	11.12
4	4.19	19.05	7.47	6.11	67.02
5	6.20	9.22	15.29	8.18	8.22
6	6.33	10.35	8.16	7.11	9.11

Data MEAN ± SEM

The data related to the effect of test drug on initial reading in hot plate for analgesic activity has been depicted. It reveals that sample EMS (roots collected in Shishira ritu) exhibits highest pain threshold of 67.02 at the initial stage.

Rat No	Control	Standard	EMG	EMP	EMS
1	5.19	16.52	7.48	5.4	6.11
2	6.33	23.25	18.41	16.79	17.21
3	9.43	30.14	7.26	10.72	11.56
4	8.23	18.00	5.12	11.69	12.44
5	7.14	27.06	12.10	16.97	10.23
6	4.14	11.15	11:54	17.18	9.33

Table 2: Effect of *Erandamoola (Ricinus comunis)* on analgesic activity at 10 min

Data: MEAN ± SEM

The data related to the effect of test drug on 10 min reading in hot plate for analgesic activity has been depicted. It reveals that Standard group exhibits maximum pain threshold and sample EMG (Greeshma ritu) has showed greater pain threshold compared to other groups at the end of 10 minutes.

Table 3: Effect of *Erandamoola (Ricinus comunis)* on analgesic activity at 20 min

Rat No	Control	Standard	EMG	EMP	EMS
1	5.21	14.44	23.16	24.99	23.33
2	10.03	6.38	16.48	15.84	18.45
3	6.20	12.09	17.56	17.00	16.78
4	6.11	7.10	18.26	11.14	13.66
5	12.33	21.13	29.06	16.36	18.34
6	16.04	12.39	17.03	20.57	17.99

Data: MEAN ± SEM

The data related to the effect of test drug on 20 min reading in hot plate for analgesic activity has been depicted. It reveals that all the 3 samples exhibited good pain threshold compared to control and standard groups.

Table 4: Effect of *Erandamoola (Ricinus comunis)* on analgesic activity at 30 min

Rat No	Control	Standard	EMG	EMP	EMS
1	10.38	18.32	42.34	45.18	35.32
2	5.58	52.17	44.29	11.44	16.88
3	7.23	40.54	31.33	11.04	23.55
4	8.37	12.12	9.25	9.17	17.89
5	11.13	12.56	31.35	12.11	34.66
6	10.28	8.38	16.31	18.05	21.09

Data: MEAN ± SEM

The data related to the effect of test drug on 30 min reading in hot plate for analgesic activity has been depicted. It revealed that sample EMP (Pravrat ritu) exhibited better pain threshold compared to other samples and is also closer to the threshold values of standard group.

Table 5: Effect of *Erandamoola (Ricinus comunis)* on analgesic activity at 40 min

Rat No	Control	Standard	EMG	EMP	EMS
1	9.38	23.71	51.00	7.52	9.22
2	5.63	50.55	25.23	15.35	21.01
3	8.37	40.05	41.40	27.35	12.11
4	5.19	24.23	9.17	9.58	10.87
5	6.09	7.46	14.47	9.51	7.56
6	5.58	6.00	9.22	23.08	22.11

Data: MEAN ± SEM

DISCUSSION

Dravya samgrahana kaala is an important scientific documentation mentioned in our text books. Phytochemical variation among plants as per seasonal variation, geographical nature, maturity, growth are few important factors one has to consider before their optimum use. *Eranda(Ricinus communis)* is an important medicinal plant where all parts of this drug area used in different pathological condition. The seeds are said to be purgative, leaves used as analgesic, anti-inflammatory. The roots are particularly indicated as Vaishya and Vitara i.e., analgesic and aphrodisiac. As per Dravyasamgarhana vidhi roots are to be collected in Hemanth-Shishira or Greeshma rutu. Nighantu karas in addition to this, advices to collect even in Pravarat rutu.

Evaluation of analgesic activity of *Erandamoola* (root of *Ricinus communis)* collected in three different Dravya samgrahana kaala, i.e., Greeshma Ritu (April-May) and Pravrut Ritu (May- June) and Shishira ritu (December- January) is an experimental study conducted in mice using Eddy's Hot plate method. Hot plate method is employed to assess the analgesic potential which acts through central mechanisms by observing paw licking and jump response to assess the effect of test drug on neurogenic pain [11].

Swiss Albino mice having weights 18-30 g were randomly grouped into 3 groups of six animals each. Group I served as control, Group II serve as standard with administration of Tramadol at 5 mg/kg body weight whereas Group III (EMG), Group IV (EMP) and Group V(EMS) serve as the test group with administration of 200 mg/kg body weight (Erandmoola collected in Greeshma (EMG), Pravrut ritu (EMP) and Shishira ritu (EMS) respectively. Careful analysis of the results indicates that in comparison to initial values, pain threshold was found to be elevated at 60 min after administration of test drug. This indicated that the effect of test drug exhibited significant central analgesic activity compared to standard drug. The hot plate method is the selective model for studying the central analgesic activity. Hence, Erandamoola collected in greeshma (EMG) and pravrut ritus (EMP) show almost similar pain threshold with a slight increase in values than drug collected in greeshma ritu (EMG). Hence it can be inferred that the drug can be efficiently used as an analgesic as it is meant to be equivalent to the standard drug. And also season or *Samgrahana kaala* is having a definite role on drug activity.

CONCLUSION

Plants are the largest source of the medicine; their activities are attributed for the various phytochemical constituents what they contain. Drug collection, storage, proper utilization is a measure factor in therapeutics. Erandamoola collected in Greeshma (EMG) and Pravrut ritus (EMP) show almost similar pain threshold with a slight increase in values than drug collected in Greeshma ritu (EMG). Thus, Samgrahana kaala is having a definite role on drug activity.

Conflict of Interest

None declared.

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