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An Experimental Study to Assess the *Rakta Sthambaka* Effect of *Kadamba* on Excision Wound in Wistar Strain Albino Rats

Author: Mohammed Faheem Abdullah¹

Co Authors: Vidyalakshmi K², Likhita D N³ and Sudhakar Bhat⁴

¹⁻³Department of Samhita & Siddhanta, Shri Dharmasthala Manjunatheshwara College of Ayurveda, Udupi, Karnataka India

⁴Department of Pharmacology & Toxicology, Shri Dharmasthala Manjunatheshwara Research Centre in Ayurveda & Allied Sciences, Udupi, Karnataka, India

ABSTRACT

Background: *Rakta* is one among seven *Dhatus* and *Sushruta* mentioned it as fourth *Dosha*. It is responsible for nourishment of the body and is responsible for origin, sustenance of life and it is the one which keeps individuals alive. *Rakta Sthambhana* is a process where the excessive flow of blood is stopped in injury or disease condition. There are many drugs mentioned to treat the cases of excessive bleeding. *Kadamba* is one among the drugs mentioned under *Rodradi Gana*. It has *Madhura, Tikta, Kashaya Rasa; Ruksha, Sheeta Guna* and *Sheeta Veerya*. *Kashaaya Rasa* is *Sheeta, Sangrahika, Samshamana, Sandhanakara, Peedaka* and *Shoshaka*. All these *Guna Karmas* helps in *Rakta Sthambhana*.

Objective: To assess the *Rakta Sthambhana* action of *Kadamba* in external bleeding. **Methodology:** An experimental study was carried out to assess haemostatic activity of *Kadamba* by inducing bleeding in Wistar Albino rats using excision wound model by taking bleeding time and clotting time as parameters.

Observation & Results: *Kadamba* showed statistically significant result with respect to reduction in bleeding time. There was statistically non-significant reduction in the clotting time.

Key Words *Rakta Sthambhana, Kadamba, Rodradi Gana, Haemostatic*

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INTRODUCTION

Blood is the liquid components of the body that gets affected due to any injury or disease. The instances of external injury leading to bleeding, is commonly seen due to increased road traffic accidents, resulting in small cuts to abrasions and deep cuts to amputations. During such instances stoppage of bleeding is the primary priority.

Rapid establishment of an effective haemostasis mainly in its topical form will be the first line of management. In last two decades, several topical haemostatic agents, which exert their effect by various mechanism have been developed and used effectively to control bleeding.

Acharya Sushruta has discussed in detail about treating the cases of wound and bleeding. He has

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advised to follow *Stambhana* during excess flow of the blood and has explained 4 methods of stopping the bleeding. During excessive flow of blood, the powder of *Rodradi Gana Dravya* drugs which has *Sthambhana* action is to be sprinkled above the wound and put pressure on the wound¹. This is the first line of action for stopping the flow of blood.

Kadamba is a widely available drug mentioned under *Rodradi Gana*². It has *Madhura, Tikta, Kashaya Rasa, Ruksha Guna, Sheeta Veerya* and *Katu Vipaka*. *Acharya Charaka* mentioned that drugs which have *Madhura, Tikta, Kashaya Rasa* and *Sheeta gunas* is responsible for the *Sthambhana* action³. *Kadamba* can be used for external application in the form of powder to arrest bleeding.

OBJECTIVE

To Assess the *Rakta Sthambhana* action of *Kadamba*

REVIEW OF LITERATURE:

Review on *Sthambhana* and *Rakta Sthambhana*

Sthambhana is the one which stops or arrests the components which are having slow or fast movement⁴. The components flowing out of the body are stopped by the action of *Sthambhana*. It can be *Rasa, Rakta, Shukra* or even *Garbha*. *Rakta Sthambhana* is a process of arresting the blood whenever there is excess bleeding. To prevent the loss of blood different modalities are adopted. *Sushruta* has advised to follow *Sandhana, Skandana, Paachana* and

Dahana. *Kadamba* is one such drug which can cause *Rakta Sthambhana*. It is explained under *Rodradi Gana* by *Sushruta*.

DRUG REVIEW

Botanical name: *Neocardia cadamba*

Family: *Rubiaceae*

Properties:⁵

Rasa – Madhura, Tikta, Kashaya

Guna – Ruksha, Sheeta

Vipaka – Katu

Veerya – Sheeta

Prabhava- Vedanasthapana

Dosha Karma- Vaatapitta Shamana

Karma – Vedanasthapana, Shotahara, Vranashodaka, Deepana, Paachana, Grahi, Sthambhaka, Shukrashodaka, Varnya, Jwaragna and Vishagna

EXPERIMENTAL METHODOLOGY:

To assess haemostatic effect of *Kadamba* excision wound model was used. The *Kadamba* was taken in powder form and Povidone Iodine was used as standard drug.

Drug Preparation

About 500gms of dried sample of *Kadamba* stem was obtained from SDM Pharmacy, Udupi. Later the drug was kept under sunlight for drying for 2 days. The drug was powdered at *Rasashastra* Lab of SDM College of Ayurveda. Fine powder of was formed.

Experimental animals:

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Wistar strain albino rats of either sex, weighing between 200-250g were obtained from the animal house of S.D.M Centre for Research in Ayurveda and Allied Sciences, Udupi. They were housed in standard transparent polypropylene cages with wheat husk bedding, renewed every 24hours. They were kept under controlled room temperature at around $25\pm 3^{\circ}\text{C}$ with relative humidity of 40-60%, on a 12hr natural day and night cycle. They were acclimatized in the laboratory condition for two weeks prior to the experimentation. They were fed with standard rat pellet diet and tap water. IAEC had approved the experimental protocol (IAEC No-SDMCAU/ACA-49/AEC 24/2018-19) and the care of animals was undertaken as per the CPCSEA guidelines.

Table 1 Animal Grouping and Intervention

Group	Intervention
Control Group	No Intervention
Standard Group	Povidone Powder
Test group	Kadamba Powder

EXPERIMENTAL DESIGN

Rats were randomly divided into 3 groups of 6 rats each as mentioned in table no.1. Group I was treated with Control, Group-II was treated with 5% Povidone Iodine Powder (Standard drug), Group-III was treated with *Kadamba Churna*.

Procedure for Excision Wound Model

This was conducted according to the technique developed by Morton and Malone. The animals were anaesthetized using Pentobarbitone (45mg/kg) intra-peritoneal route. After the animals were sufficiently anesthetized, they are

secured to the dissection plate in prone position. The hairs were removed using shaving blade from the part to be operated and subsequently the area is cleaned. A round seal of 2.5 cm in diameter was impressed on the dorsal thoracic central region 5cms away from the ears of the anaesthetized rats. Full skin thickness from the marked area was excised in circular fashion with the help of forceps, surgical blade and scissors. After achieving full haemostasis, the animals are placed in individual cages.

External application of *Kadamba Churna* was started from the 1st day of post wounding. Control groups left without applying drug to observe the natural healing process and 5% Povidone Iodine Powder is applied for the rats in the standard group. Quantity sufficient powder is dusted on the wound, till the area of wound is covered. Drug is applied once a day for 24 days. The grouping of animals and intervention is shown in Table no.1. Each group having 6 rats were kept in separate metabolic cages.

OBSERVATION AND RESULTS

Bleeding time was calculated on 1st, 5th, 10th, 15th, 20th and 24th post wounding days. Clotting time was calculated on 1st, 10th, 20th and 24th post wounding days.

On day 1 there was no any observable changes noted in the bleeding time in test group. In standard group there was slight reduction in bleeding time. On day 5, 10 and 15; there was marked changes in the bleeding time in test group

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whereas in standard group it was similar to 1st day bleeding time. On day 20 and 24 there was very much reduction in bleeding time in test group in comparison to other groups. Bleeding time in standard remained almost constant throughout study.

The clotting time was ranging between 30-90seconds in all the 3 groups. There was slight reduction in clotting time in test group in comparison to other groups on first day. On 10th day there was slight reduction in clotting time in both standard and test group, which remained constant on day 20 and 24.

BLEEDING TIME		
1	NSD	NSD
5	NSI	NSD
10	NSD	VSD
15	NSI	VSD
20	NSI	NSD
24	VSD	VSD
CLOTTING TIME		
1	NSI	NSD
10	NSI	NSI
20	NSD	NSD
24	NSD	NSD

Table 2 Consolidated statement of the results

Consolidated statement of results of bleeding time and clotting time are given in table no. 2:

Effect of Kadamba on Bleeding Time

Significant changes were observed on bleeding time factor. Statistically the test group showed very significant reduction in the bleeding time when compared with standard and control group. This shows that *Kadamba Churna* acts locally at the site of injury and reduces the bleeding. Reduction in bleeding time was markedly observed after 5th day.

Effect of Kadamba on Clotting Time

Slight changes were observed on clotting time factor. There was reduction in the clotting time when compared with standard and control group. The reduction was statistically non-significant suggesting no considerable effect of *Kadamba* on clotting time. It shows the systemic effect of *Kadamba* is very limited as clotting time is calculated after drawing blood from the retro-orbital plexus.

Effect of Kadamba on Wound Healing Property

The *Kadamba Churna* also showed good effect on the wound since Day 1. There was non-significant increase in the wound contraction time when compared with standard and control group. Which shows that it has wound healing property.

Discussion on Haemostatic action of Kadamba

Kadamba has predominant *Kashaya Rasa* along with *Tikta* and *Madhura Rasa*, it has *Ruksha* and *Sheeta Guna* with *Sheeta Veerya*⁵. *Kashaaya Rasa* produces *Shoshana* at the site of the wound and causes stiffness of tissues. *Ruksha Guna* does *Shoshana* of flowing *Rakta*; thereby reduces the movement of *Rakta*. *Sheeta Veerya* and *Sheeta Guna* causes constriction of small vessels at the site of the wound and results in reducing the flow of blood.

Kadamba helps in haemostasis at two stages; Due to the cold nature of drug it causes constriction of small blood vessels at the site of injury and thereby reduces the flow of blood. The powder of drug *Kadamba* is dry in nature and has more surface area. When the drug is dusted at the site

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of injury it sticks to the surface of blood vessels and plugs the area. Also it provides surface area for platelet adhesion.

CONCLUSION

Methods for stopping the flow of the blood are *Sandhaana*, *Skandana*, *Dahana*, *Paachana*. Dusting of the powder of *Rakta Sthambhaka* drugs stops bleeding by methods of *Sandhaana* and *Skandana*. Dusting of *Kadamba* powder in external bleeding in case of albino rats showed reduction in bleeding time; but no significant reduction in clotting time. Also there was faster wound contraction. During the study it was observed that *Kadamba* has both haemostatic effect and wound healing property which resulted in local *Rakta Sthambhana*.

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