



AN EXPERIMENTAL STUDY OF RAKSHOGHNA ARKA FUMIGATION TO PREVENT GROWTH OF MICRO-ORGANISMS COMMONLY PRESENT IN OPERATION THEATRE

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Abstract

Sterilization is the process that kills all forms of bacteria, disease, fungi, and viruses. Disinfection procedures before and after a medical event prevent the transmission of germs. Not only will it protect the patients, but also the medical professional. Sterilization is primary step before any minor or major surgical procedure. It is also important in both OPD and IPD basis during treatment of patients. Hence to maintain healthy environment in hospital research study is carried out. Now days most commonly sterilisation of operation theatre done by formalin or formalin and KMNO₄(Potassium permanganate). But there are some common side effects of this method as irritation to eye, headache, very strong smell, etc. and some serious conditions like COPD, psoriasis, conjunctivitis, indigestion, insomnia, etc. It may be toxic to small children and pets. To overcome above side effects Dhupan with Ayurvedic Dhupan Dravyas are used for sterilization purpose as per mention in our Ayurvedic texture. There was significant research work was going on Dhupan since last 20 decades. Many positive outcomes are seen by these Dhupan and practiced but there were some side effects of Dhupan also as fumes of Dhupan are irritant to eyes, Dhupan cause damage to glasses of windows and light source, it causes stain to ceiling of operation theatre. That's why to minimise such side effects Dhupan formulation prepare with distillation method (Arka preparation) use for fumigation purpose.

Keywords: Rakshoghna Arka, Dhupan Dravyas, Fumigation, Operation Theatre, Rakshoghna Gana

Introduction

Sterilization is the complete removal or destruction of all forms of microbial life, including vegetative bacteria, viruses, fungi, and highly resistant bacterial spores(1). The first step in every surgical or medical-surgical treatment is sterilization. It is very important in surgical practises. Proper use of sterilization prevents unnecessary use of antibiotics which may prevent further complications in health profession and ensure extra safety of patients. Disinfection procedures before and after a medical event prevent the transmission of germs. Not only will it protect the patients, but also the medical professional. It is the process of freeing an article whether it is a surface or a medium from all micro-organisms by removing or killing them. It acts in vegetative and sporing states.

Methods (2)-

Physical Method – Autoclaving

Chemical Method – Disinfectant like Silver nitrate + Hydrogen Peroxide, Savlon, Dettol, Spirit.

There are different methods and machines for sterilization to make it infection free

1.Fumigation 2. Ultra violet rays

Fumigation Method - Silver nitrate + Hydrogen Peroxide fumigation of formalin but side effects are too many.

In Ayurveda sterilisation is done by Dhupan (3). The fumigation carried out using fine powder of selected drugs with the intention of Nirjantukarana (4) (sterilisation) is called Dhupan. It is an inseparable part of Ayurveda which is done by various herbal and Herbo-mineral medicines. Operation theatre is one of the main places for post operative infection if proper aseptic precautions not taken. Hence proper sterilisation of operation theatre most important part before performing any surgical procedure. With Rakshoghna Dravyas which are explained in Sushrut Samhita Sutra Sthana Agropaharaniya Aadhya (5), we can determine the effect of it as bactericidal and fungicidal and we can verify same with modern statistics. But there were some side effects of Dhupan also as fumes of Dhupan are irritant to eyes, Dhupan cause damage to glasses of windows and light source, it causes stain to ceiling of operation theatre. Keeping this view in mind, this study is taken up as a step forward to prove the efficacy of Rakshoghna Arka on common microbes found in operation theatre environment. That's why to minimise such side effects Dhupan formulation prepare with distillation method (Arka preparation) use for fumigation purpose.

Aim- To Study the efficacy of “Rakshoghna Arka” fumigation in prevention of growth of microorganism commonly present in operation theatre.

Objectives- To Study the efficacy of “Rakshoghna Arka” fumigation in prevention of growth of microorganism commonly present in operation theatre, to study the probable mode of action of “Rakshoghna Arka” fumigation and to standardize the process of Fumigation.

Materials & Methods

Study setting –

- The entire study was carried out in Shalyatantra Minor Operation Theater.
- The two-formalin chamber/identical chambers were taken.
- The chambers were kept open in Shalyatantra Minor OT for 7 days.
- Pre swab from both chambers was taken.
- In one chamber Rakshoghna Arka was taken and another chamber formalin tablet was kept.
- Both the chamber was kept close for 24 hrs.

g. Post swab was taken from both the chambers.

h. Next time gauze piece infected with pus of the same source/patient was kept for 24 hrs. before fumigation and same procedure as above was carried out.

Study Population- Microorganism present in close chamber.

Inclusion Criteria And Exclusion Criteria:

Inclusion Criteria

- 1.Common bacteria
- 2.Common fungus

Exclusion Criteria

- 1.Common Viruses.
- 2.Uncommon bacteria and fungus.

Sampling Technique

Simple random sampling method on the basis of Inclusive criteria and Exclusive criteria.

Study Duration : 18 Months

Clinical study was carried out mainly into following phases —

- a.Preparation of Rakshoghna Arka.
- b.Taking pre-fumigation swab and settle plate count
- c.Fumigation with Rakshoghna Arka/formalin in minor OT
- d.Again, taking post-fumigation swab and settled plate count
- e.Assessment of results.

Preparation Of Rakshoghan Arka -

- a.Standard market packages of Agaru, Shuddha Guggul, Shwet Sharshapa, Vacha, Nimba, Sarjarasa, Saidhav Go-ghrita and Vacha were purchased from market.
- b.All the drugs were identified and authenticated from ISO certified Pharmacy.
- c.Rakshoghna Arka was prepared under guidance of experts by using principle of Arka Kalpana as described in Sharangdhar Samhita (6).

Drugs-

- 1.Agaru
- 2.Shuddha Guggul
- 3.Shwet Sharshapa
- 4.Vacha
- 5.Nimba
- 6.Sarjarasa
- 7.Saidhav
- 8.Go-ghrita

Sushruta has not mentioned the exact amount of each drug to be taken. So, by using the principal mentioned below by Sharangdhar (7), all six drugs were taken in equal amount.

Table No.1-

INGREDIENTS	QUANTITY
1.Agaru	20 gm
2.Shuddha Guggul	20 gm

3.Shwet Sharshapa	20 gm
4.Vacha	20 gm
5.Nimba	20 gm
6.Sarjarasa	20 gm
7.Saindhav	20 gm
8.Go-ghrita	20 gm
9.Water	1600 ml

Place of work: Rasa Shastra Department of Research institute.

Material: Raw herbal medicine, Water, Distillation Apparatus, Measuring flak, Glass container.

Procedure:

- 1.Raw materials needed to prepare Rakshoghna Arka i.e. Agar, Shuddha Guggul, Shwet Sharshapa, Vacha, Nimba, Sarjarasa, Saidhav (all churna form) and Go-ghrita will Collected.
- 2.Drug standardization will be done.
- 3.All the above Dravyas will be taken in equal amounts.
- 4.The 10 parts of water added into Dravyas and mix together and soaked in water for 24 hours.
- 5.The soaked Dravya then poured in distillation apparatus and simple distillation process will be performed.
- 6.As per Arka Kalpana mention in Sharangdhar Samhita the 60% distilled Arka collected.
- 7.By above mention quantity 960 ml will Arka obtained
- 8.The distilled final product was collected in glass apparatus and used for fumigation purpose.



Agaru



Shuddha Guggul



Shwet Sharshapa



Vacha



Nimba



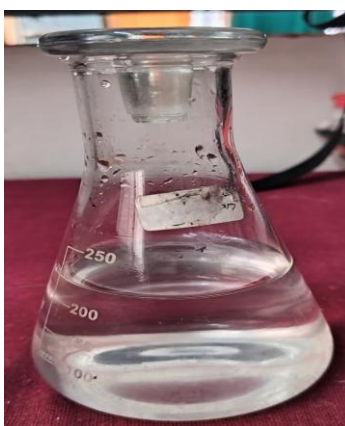
Sarjarasa



Saindhav



Go-ghrita



Rakshoghna Arka

Assessment Criteria

Sr. No.	Parameters		
1	IRRITANT TO EYE	Absent	-
		Mild	+
		Moderate	++
		Severe	+++
2	SMELL	Irritant	-
		Neutral	+
		Good	++
3	IRRITANT TO NASAL MUCOSA	Absent	-
		Present	+
4	BLUR VISION	Absent	-
		Present	+

5	DRY AND SOUR THROAT	Absent	-
		Present	+
6	HEADACHE	Absent	-
		Present	+
7	COUGH	Absent	-
		Present	+

- Pre Rakshoghna Arka fumigation swabs were taken from wall, lamp, trolley, table and floor along with air samples from Minor operation Theatres.
- Air samples were taken by settle plate method.
- Similarly post Rakshoghna Arka fumigation culture swabs were taken after 48 hours of fumigation from Minor Operation theatre.
- The swabs and settled plates were taken to microbiology lab for further analysis. The swabs were spread on selective medium plates.
- These plates were then incubated for 18-24 hrs. at 370 C.
- Colony counting was done and observations were noted. (CFU/ml).
- All process was done with utmost precautions and aseptic conditions.

Result

On the basis of above observations, following result of the antimicrobial study can be drawn-

- As per the statistical analysis, the results of fumigation with Rakshoghna Arka were found to be equally significant as the standard drug at 5% level of significance against E. Coli.
- Rakshoghna Arka fumigation was found equally significant as standard drug at 5% level of significance against S. Aureus.
- Fumigation with Trial group (Rakshoghna Arka) against P. aeruginosa was found to be equally significantly effective as the standard drug at 5% level of significance.
- Fumigation with Trial group (Rakshoghna Arka) against Clostridium Tetani was found to be equally significantly effective as the standard drug at 5% level of significance.
- Both fumigants proved to be equally significantly effective at 5% level of significance against Clostridium Tetani and Aspergillus Niger when Rakshoghna Arka was used at 50 µg concentrations.

So, the statistical result states that, at the above mention concentrations the Trial drug (Rakshoghna Arka) was found to be equally effective as the Standard drug against these micro-organisms.

The swab results after the fumigation process of the closed chambers were found to be negative in all 10 samples for both the trial and control groups. Thus, we can consider that both the groups are equally effective as disinfectants at 5% level of significance.

Further, Rakshoghna Arka did not produce any kind of irritation to the eyes and nasal mucosa, it had a good smell, did not cause any symptoms like dry or sore throat, headache and cough, etc. On the other hand, Formalin had an irritating smell and caused irritation to the eyes and nasal mucosa, dry and sore throat, blurry vision, headache and cough but it was also slightly cost effective than Rakshoghna Arka. The lamp, table, trolley, wall, and floor were all swabbed. Before and after Fumigation, a colony count was conducted in the microbiology lab. The settle plate method was used to count the air colonies both

before and after Fumigation. As a result, each reading included three pre-fumigation and three post-fumigation values (one reading every month for 3 consecutive months) in the closed chambers for both the control and trial group (swab bacterial and fungal counts before and after Fumigation), and the settling plate count of different micro-organisms before and after was noted. In each reading, the post Fumigation colony count was seen to decrease in closed chambers where trial drug was used significantly.

Swab Results

Both Trial Group and Control Group got the swab results negative after the fumigation in all of 10 samples each. As the results are found to be 100% for both groups, we can consider both the groups are equally effective as disinfectants.

Results For Other Parameters

In Trial Group, no irritation to eyes, good smell, no irritation to nasal mucosa, no blur vision, no dryness and sore throat, no headache and cough was observed in any sample out of 10. On the other hand, irritation to eyes was found in all 10 samples of Control Group. Thus, Trial Group can be considered as more beneficial compared to Control Group. Considering the above points, it was observed that the Trial Group (Rakshoghna Arka) is less irritant and poses less side effects on exposure in comparison to the Control Group (Formalin).

Discussion

The most crucial aspect of every research study is the discussion. It includes a description of the findings from the applied research. All discussion is the observational data logically reasoned. When all the points are properly stated and supported by reasoning, appropriate conclusions can be reached. It serves as a link between the conclusions and the findings. The goal of research work, which is to derive conclusions from the data and findings, can only be achieved through a well-done discussion. Discussion is therefore the fundamental component of all research projects. A clinical study has been done titled as- “An Experimental Study of Efficacy of Rakshoghna Arka Fumigation in Prevention of Growth of Micro Organism”.

Conclusion

The study entitled as “An Experimental Study of Efficacy of Rakshoghna Arka Fumigation (8) in Prevention of Growth of Micro Organism” was carried out in a closed chamber of 3x3 ft. size kept in the Shalya tantra Minor OT for 7 days. Fumigation was done with both the Trial Group (Rakshoghna Arka) and Control Group (Formalin) in required quantities every month for 3 consecutive months and swabs were taken before and after the process. Growth of certain micro-organisms in these chambers was recorded by the settle plate method to draw the effectiveness of these fumigants. At the end of the study few conclusions were drawn on the basis of observations noted, results obtained and discussion with few experts. These are as follows- Rakshoghna Arka is an efficient fumigant against many micro-organisms like-E. Coli, S. Aureus, C. Tetani, P. aeruginosa and A. niger. The action of Rakshoghna Arka on these micro-organisms proved to be antimicrobial and antifungal. As per the statistical analysis, the results of fumigation with Rakshoghna Arka were found significant at 5% level of significance against E. Coli at Vol. 33 No.02 (2026): JPTCP (1346-1354)

50 µg concentration. It was found significant at 5% level of significance against *S. Aureus* at 50 µg concentration. Fumigation with Trial group (Rakshoghna Arka) was found to be significantly effective at 5% level of significance against *P. aeruginosa* at 20 µg and 50 µg concentrations. Rakshoghna Arka fumigation proved to be significantly effective at 5% level of significance against *S. Aureus* at 20 µg and 50 µg concentrations. At the above-mentioned concentrations, the Trial drug was found to be equally effective as the Standard drug against these micro-organisms. Fumigation of a 3x3 ft. close chamber with Rakshoghna Arka prepared with help of Rakshoghna Dravyas (9) mention in Sushrut Samhita (10) proved to be efficient against these micro-organisms when the values were taken after 24 hours. The swab results after the fumigation process were found to be negative in all 10 samples for both the trial and control groups. Thus, we can consider that both the groups are equally effective as disinfectants at 5% level of significance. Control Drug Formalin(11) was found to be slightly cost effective than the Trial Drug (Rakshoghna Arka) as fumigant for fumigation, but on comparing the other assessment criteria Rakshoghna Arka as it did not cause any irritation to the eyes, Had good smell with fragrance, did not produce any irritation to the nasal mucosa, had no effect on vision like blurring of vision, did not produce any effect on throat like soreness or dryness, did not cause any headache and also, did not produce sign and symptoms of cough. On the other hand, the control drug (Formalin) had an irritating smell and caused irritation to the eyes and nasal mucosa, dry and sore throat, blurry vision, headache and cough. So, it can be concluded that use of Rakshoghna Arka as a fumigant (12) is equally effective and safer than Formalin.

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