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**Title: Concept of Sterilization in Ayurveda Compendia**

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**Abstract:**

Sterilization<sup>1</sup> is the process of freeing an article, a surface or a medium of all microorganisms by removing or killing them. In surrounding environment there are billions of microorganisms. Maximum of them are lived with human beings in commensalism which are not harmful but hazardous to immunocompromised host. Also they found to be hazards to open wounds, operation theaters, labour rooms, in patient ward.

In surgery the Sterilization has its prime importance. Without sterilization it causes complication such as infection, impaired wound healing etc. By means of these complications, it obstructs the better recovery of operated patients as well as increases the hospital stay of patients. Acharya Shushruta has explained various surgeries and at the same time he also described the concept of sterilization in Purvakarma (pre operative procedure). The present article describes the various methods and aspect of sterilization in classical text and also its implimentation in present scenario.

**Keyword:** Sterilization, Disinfection

## Introduction:

Our surrounding environment there are billions of microorganisms. Maximum of these are not harmful and lived with human beings in commensalism but they gives the opportunistic hazard to immunocompromized host.

Such microorganisms may prove dangerous in open wounds, in operation theaters, in patient's wards, in neonatal wards, in labour rooms where host defense mechanism is not that much to protect against these pathogens. They may enter and causes diseases in host that affect better recovery after operation and also increase the patient hospital stay. Thus proper sterilization disinfection plays a major role to deal such consequences.

Ayurveda explained the holistic approach towards positive life style. It deals with both preventive and curative aspect of diseases this is very important in today's global scenario. Ayurveda has mentioned the treatment modalities as topical (Bahiparimarjan), systemic (Antaparimarjan), and surgical interventions (Shastrapranidhan)<sup>2</sup>. The todays modern surgery evolved on the basis of principles of Shalyatantra laid by Sushruta. In Sushrut Samhita various surgeries like cataract (lingnash), plastic surgery (sandhan karma), urinary calculi (ashmari), orthopedic surgeries (asthibhagna), fistula in ano (bhagandara), sinus (nadvrana) and some gynecological procedures. For the successful surgery Sushruta explained in Purvakarma, the various methods of sterilization of vranitagar, sutikagar, kumaragar such as kashay, parishek, dhupan, agnitapan etc. They were mentioned sporadically in

classical text under various surgical procedures.

In the 'Nibandhasangraha' the comentry of Dalhana on Sushruta samhita Chikitsastan 2nd chapter, mentioned about sterilization of instruments as

This is the very precise concept of flaming the instruments before operative procedures was explained by Sushruta which is physical method of sterilization. Further Archaya Dalhana explained the complications that this flaming of instruments if not done then it becomes prone for infection in the operated site or wound. Today in modern surgery, before the surgical procedures this same physical method of sterilization is followed. Otherwise it contaminates the wound or wound gets infected. The flaming destroy all the spores of microorganism and thus prevent infections.

The Dhupan karma i.e. fumigation characterized under topical (bahiparimarjana) treatment which has been told as a treatment in all classics of Ayurveda. The detailed description is available in Kashyap Samhita. This medicated smoke (dhupan) creates aseptic environment which kills the microbes thus prevents the infections. Some Dhupan dravya with its applicability in fumigation described as follows:

- Nimba (*Azadiracta indica*)

Its active constituent possesses insecticidal and insect repellent activity. The *A.indica* fumes acts against *Streptococcus pyogenes* after 10 min exposures, 100% inhibition. Fumigation of volatile oils of *A.indica* has potent insect repellent property<sup>4</sup>.



- Guggulu (*Commiphora mukul*) :

Extract of guggulu have the potential action on both gram positive and gram negative bacteria<sup>4</sup>.

- Sarshapa (*Brassica campestris*):

This contains contrasting profile of glucosinolates which have the biocidal action on different pathogens including bacteria and fungi. Fumigation of Sarshapa is effective against nematodes<sup>4</sup>.

- Ela (*Elettaria cardmomum*):

It contains the volatile oils which have the antimicrobial and antifungal activity<sup>4</sup>.

- Haridra (*Curcuma longa*):

It exhibits the fumigant activity against beetles and insect. Haridra itself act as antibacterial agent and also having antifungal activity<sup>4</sup>.

- Jatmansi (*Nordostachys jatamansi*):

It contains essential oil having antimicrobial activity<sup>4</sup>.

- Tulsi (*Ocimum sanctum*):

Extracted essential oil suchas chavicol, euginol, linalool, camphor and some biologically active constituents that are insecticidal, nematicidal and fungicidal<sup>4</sup>.

Sushruta describe the Rakshogna dhupa<sup>5</sup> containing Sarshap (*Brassica compestris*), Nimba Patra(*Azadiracta indiaca*) which has been told to use for vranit means operated patient for wound management.

Charaka described 32 lepa<sup>6</sup> and pradeha in 3<sup>rd</sup> chapter of Sutrasthana the various drugs for formulations in the management of skin infection. Charaka also described mahakashaya like kushthagna mahakashaya, kandugha mahakashya, krumigha mahakashaya, vishaghna mahakashaya for the same. These are used in infective conditions for sharirparimarjana both antaha and bahiparimarjana. This explains the disinfection and sterilization that how they were used for wound healing to prevent further infections.

Sushruta also discribed the Mishrak Gana<sup>7</sup> like, Arkadi gana, eladigana, Patoladigana, Aragvadhagana wich are used for disinfections. In the description of dincharya , Sushruta has recommended some plants used for toothbrush. He recomonded tikt rasa (bitter) plant toothbrush stick made of Nimba(*Azadiracta indiaca*), karanja(*Pongamia pinnata*), Karanj.etc. that are disinfectant and remove foul smell from mouth.

Sushruta also described the different types of Bandha (bangaging) which suggest how the ancient science have the idea about bacterial infection<sup>8</sup>.

In Ashtanghridaya Uttarstan 1<sup>st</sup> chapter Balopcharniya adhyaya<sup>9</sup>, it was described to tie some of krimihar dravya as Hingu (*Ferula foetida*), Vacha (*Acorus calamus*), Sarshapa(*Brassica campestris*), Bramhi(*Bacopa monniera*), Jivaka(*Cuminum cyminum*), on door, head side of bed, in neck of infant which act as disinfectant by repelling insects and thus helpful in better health in children.



### Conclusion:

It can be evident that the maximum drugs have antibacterial properties and very much effective against bacterial opportunistic infections. The ancient science also has the idea about the foreign infections. They also stated the various methods for disinfection and sterilization which have been used at that time. By the time lots of revolutions takes place. There are many methods of sterilization are available in today's modern science which are based on same principles mentioned in classical text. It is necessary to have more detailed and systemic evaluations of ancient method used for sterilization in pharmacodynamic and phytochemical view.

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