

Conceptual review of asepsis , antiseptis & sterilization in Ayurveda.

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Abstract:

Sterilization is the process of freeing an article, a surface or a medium of all microorganisms. Asepsis is the state of being free from or keeping away disease-producing microorganisms like bacteria, viruses, etc. For the success of any surgical treatment Sterilization and Aseptic precautions are of prime importance. Lack of sterilization and aseptic precautions leads to complications, infection, delayed wound healing, etc. Now a days in modern era there are various chemical & physical methods of sterilization. But the concept of ancient Sterilization and Asepsis is same, cost effective, having medicinal values also. The ancient *Acharyas* used *Agni* (Fire), *Kwath* (Decoction) & various medicated fumigating *yogs* to protect *Atur* (patient) from different organisms. The ancient *Acharyas* mentioned various *Dhoopan* with *Rkashoghanyadravyas* for sterilization of OT rooms with that explain some aseptic precautions. So, an effort is made to

establish an Ayurvedic sterilization and Aseptic Technique in this era.

Keywords:

asepsis, antiseptis, sterilization, *kushtaghna*, *kandughna*, *krumighna*

Introduction:

In our surrounding environment there are billions of microorganisms. From which some are hazardous to human being mainly to immune-compromised hosts. Such organisms may prove dangerous in open wounds, in OT, in patient wards, in neonatal wards, in labor rooms, where host defense mechanism is not that much to protect against these pathogens. They may enter and cause disease in host that affect recovery after operation and also increase the patient hospital stay. Thus, proper sterilization, disinfection and aseptic precautions play a major role to deal or to avoid such consequences. The sterilization can also be translated in ayurvedic context as *Nirjantukikaran* or *Rakshakarma*.

Ayurveda explains a variety of techniques for keeping macro or micro

organisms from harming a patient's wellbeing or destroying them. They go over things like *Dhoopan*, *Vranshodhan*, *Vranbandha*, the surgeon's and patient's hair and nails being cut, wearing clean white clothing, *Yam*, *Niyaman*, and so on. They used different terms for macro organisms in ancient *samhitas*, such as *krimi*, *makshika*, and so on, but they don't recognize or justify microbes or germ theory. However, references in ancient *samhitas* such as *bhutbadha*, *grahabadha*, and *pak uttapti* in wounds suggest the presence of microbes or germs.

Ancient *Acharya's* give so many importance to *Shuchi* i.e. cleanliness for patient health point of view. They mentioned cleanliness regarding *vaidya* (surgeon), *atur* (patient), *vranitagar* (IPD). But in modern era same concept & importance of cleanliness in surgery was mentioned or pointed out in 1847 by Hungarian physician Ignaz Semmelweis. After that the sepsis, antisepsis, asepsis terms established. Sepsis defined as a serious condition resulting from the presence of harmful microorganisms in the blood or other tissues & the body's response to their presence, potentially leading to the multi failure of various organs, shock & death. Antisepsis defined as Preventing the growth of disease-causing microorganisms. Asepsis defined as the exclusion of bacteria & other microorganisms, typically during surgery.

स्वस्थस्य स्वास्थ्यरक्षणमातुरस्य विकारप्रशमनं च॥ (च.सू.30/26)

The most important objective of Ayurveda is preservation of health of the healthy & pacification of diseases in the patients. To achieve these objectives,

Acharyas listed various ways to keep *Tridosha* in *Samyak sthiti*.

There are several references in Ayurved classic which point out to asepsis & sterilization. They have been complied below.

For *Vaidya* (Surgeon):

- नखरोम्णा शुचिना शुक्लवस्त्रपरिहितेन छत्रवता दण्डहस्तेन सोपानत्केनानुद्धतवेशेन सुमनसा कल्याणाभिव्याहारेणाकुहकेन बन्धुभूतेन भूतानां सुसहायवता वैद्येन विशिखाऽनुप्रवेष्टव्या॥३॥²) सु सु १०/३ (

In *Yogyasutriya Adhyay*, after being purified from bathing and cutting the nails and hair, *Vaidya* joins the *Visikha* (operation Theater) wearing a clean, white dress.

- प्रक्षाल्य पयसा दिग्धं तृणशोणितपांशुभिः प्रवेशयेत् कृत्तनखो घृतेनाक्तं शनैः शनैः । (सु चि २/५७)

In abdominal open trauma when intestine get infected with soil, blood or other substances then it should be cleaned with milk and properly inserted back into abdomen with cleaned hands having cutting nails.

अग्नितप्तेन शस्त्रेण छिन्द्यान्मधुसमायुतम्¹¹ (सु चि २/४६)

“अग्नितप्तेन शस्त्रेण छिन्द्यात् अन्यथा अतप्त शस्त्रच्छेदेन् पाक भयं स्यात्”¹²) दल्हन् ततो गुग्गुल्वगुरुसर्जरसवचागौरसर्षपचूर्णैर्लवणानि म्बपत्रविमिश्रैराज्ययुक्तैर्धूपयेत् ।

आज्यशेषेण चास्य प्राणान् समालभेत¹³) सु सु ५/१८(

Until making an incision, the blade or instruments should be fired; if not, the clean wound would become infected, resulting in pus forming.

For Atur (Patient):

• प्रशस्तवास्तुनि गृहे शुचावातपवर्जिते निवाते न च रोगाः स्युः शारीरागन्तुमानसाः³) सु सु १९/४(

In Vranitopasniya Adhyay, Vranitagar (IPD) built in the expansive land, which is pure and is prohibited from direct sunlight, and is devoid of air vents, living in it does not cause physical mental diseases.

•

तस्मिन् शयनमसम्बाधं स्वास्तीर्णं मनोजं प्राक्शिरस्कं सशस्त्रं कुर्वीत⁴) सु सु १९/५(

Patient's bed should be laid in such a wide house and properly fitted and cover with clean cloth.

• मक्षिकाद्या बाधाः परिहरेत्⁵) सु सु १९/२० (

In Vranitagar (IPD) houseflies, mosquito barriers should be applied.

• सदा नीचनखरोम्णा शुचिना शुक्लवाससा⁶) सु सु १९/२३(

Patient should always have a short fingernail and short hair, wearing a holy, white garment.

• न तुदेन्न च कण्डूयेच्छयानः परिपालयेत्⁷) सु सु १९/३०(

Ulcers should not be scratched which may get infected due to infected nails and leads to impaired wound healing.

• तत्सूत्रैकदेशं च कुमारस्य ग्रीवायां सम्यग् बध्नीयात्⁸) सु शा १०/१४(

After cutting the umbilical cord from placenta of infant, tie it well in the neck of the infant with the help of thread so that it could not get infected by urine and stool of infant itself.

• रूप्यहेमप्रतप्तेन वा वारिणा स्नापयेदेनं

कपित्थपत्रकषायेण वा कोष्णेन यथाकालं यथा दोषं यथाविभवं च⁹) सु शा १०/१५(

Tap the silver or gold and extinguish it and bathe the child with that warm water. Because after extinguishing red hot silver or gold into water its ions get dissolve in that water which having antiseptic property.

For vranitagar, sutikagara, kumaragar, etc. for wound (vrana), for instruments (Yantra & Shastra) sterilization methods like Fumigation (Dhoopan) with rakshoghandravayas like Guggulu, Sarjaras, Vaca, Sarshap, Lavna, Nimba, with cow ghee, Kashay, Parishekah, Agnitapn, etc. are also used.

Achary Sushruta has explained 60 Upkramas as a Rakshavidhan in Shashthi Upkrama. He has said Vranit (Patient) should be protected by giving Dhoopan (Fumigation), Mantras, Yamas, Niyamas (rules of self-restraint).

Susharuta describe the patient's room (Vranitagar)as,

प्रशस्तवास्तुनि गृहे शुचावातपवर्जिते

निवाते न च रोगाः स्युः शारीरागन्तुमानसाः¹

⁴) सु सु १९/४(

The place or ward where patient is to be admitted should be specious & fresh which will lead to good health & healthy mind state of patient.

सर्षपारिष्टपत्राभ्यां सर्पिषा लवणेन च

द्विरहनः कारयेद्धूपं दशरात्रमतन्द्रितः¹⁵)

सु सु १९/२८(

The mixture of Sarshap, Sarpisha & Lavana is to be fumigated in the patient's room twice a day for ten days, it works as disinfectants.

- वातात्मकानुग्रजान् सासावानपि च व्रणा
नृसक्षौमयवसर्पिर्भिर्धूपनाङ्गैश्च धूपयेत्
॥¹⁶॥ सु. चि १/८० (

The pain, pus discharge at the sight of wound should get disinfected by letting the fumes of *Guggula*, *Grita*, *Yava*. This will lead germ free wound & healing with acceleration.

- व्रणधूमं शरावसम्पुटोपनीतेन नेत्रेण व्रणमान
येत्, धूमपानाद्वेदनोपशमो व्रणवैशद्यमाप्ना
वोपशमश्च भवति ॥¹⁷॥ सु. चि ४०/१९(

Shushruta has said *vranadhoopan* gives in a manner that medicated steam produced by ayurvedic drugs is applied to the wound in *SharavSamputa* (Closed container made by soil).

- मक्षिका व्रणमागत्य निःक्षिपन्ति यदा कृमीन्
| श्वयथुर्भक्षिते तैस्तु जायते भृशदारुणः ॥¹⁸॥
सु. चि १/११९(
- तीव्रा रुजो विचित्राश्च रक्तास्रावश्च जायते | सु
रसादिर्हितस्तत्र धावने पूरणे तथा ॥¹⁹॥ सु. चि
१/१२०(

When wound is infected with worms or insects it should be cleaned & disinfected by giving *Dhavana* (Wash) of ayurvedic formulations (*Kwathkalpna*) of *Surasadigana*.

In *Charak Samhita* an independent chapter dealing with *Janopdodhvamsa* (Epidemics), in that many measures for purification of air, water, soil. These are aimed to control and elimination of harmful macro & microorganisms.

Charak in *sutrasthan* 3rd chapter (*Argvadhiyam*) Has describe 32 *Lepa* & *Pradeha* (Drugs for local application) consist of various drugs formulations in management of skin diseases like

eczema, scabies, leprosy, etc. which acts as a *Krumighana*.

In *Charak Chikitstasthan* 23rd chapter there is formulation for fumigation which would kill serpents, rats, insects of clothes. The herbs enumerated are *Jatu*, *Sevya*, *Guggul*, *Bhalatak*, *Kakubhapushpa*, *Sarjaras*. In *Vranchikitsa* also there are formulations for local irrigation, application & fumigation to be used for *vranashodhan* (*vran* cleansing and purifying) which acts as a disinfectant.

In *Charak Sutrasthan* 4 there are *Kushthaghna*, *Kandughna*, *Krimighna* *Mahakashay* mentioned that consist antimicrobial as well -

Sr. No.	Name of Mahakashay	Content
1	<i>Kushtaghna</i>	<i>Khadir</i> , <i>Abhaya</i> , <i>Amalki</i> , <i>Haridra</i> , <i>Arushkar</i> , <i>Saptaparna</i> , <i>Argvadha</i> , <i>Karvir</i> , <i>Wavding</i> , <i>Jatipraval</i>
2	<i>Kandughna</i>	<i>Chandan</i> , <i>Jatamansi</i> , <i>Krutmal</i> , <i>Naktmal</i> , <i>Nimb</i> , <i>Kutaj</i> , <i>Sarshap</i> , <i>Madhuk</i> , <i>Daruharidra</i> , <i>Musta</i> .
3	<i>Krumighna</i>	<i>Akshiv</i> , <i>Marich</i> , <i>Snuhi</i> , <i>Kebuk</i> , <i>Wavding</i> , <i>Nirgundi</i> , <i>Kinihi</i> , <i>Gokharu</i> , <i>Vrushaparnika</i> , <i>Akhuparni</i> .

In *arkadigana* plants like *arka*, *Alarka*, *Karanjadvyva*, *Nagadanti*,

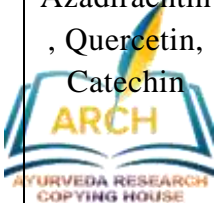
Mayuraka, Bhargni, Rasna, Indrapushpi, Ksudrasveta, Mahasveta, Alavana are said to have property to cure *Krumi* (worms), *Kustha* (skin diseases), *Vranavishodhana* (wound cleansing & purifying).

In *Astang Sangraha Uttarsthan* chapter-1 it is described to tie a cotton pouch containing *Hingu, Vaca, Turuska* & *sarsapa* on the upper frame of door & head side of bed & also in neck of infant & mother for protection which possible acts as repellent for insects. They also mentioned of fumigants for baby's room consisting of dried crow feathers with

Trivrtta, Vaca, Kustha, Sarsapa with little *Gruta*.

In *Astang sangraha* Chapter -38 also there is a mention of *Vrana-RaksoghnaDhupa* consisting of *Guggulu, Agaru, Sarjarasa, Vaca, Hingu, Lavana, Nimbapatra, Ghruta* for fumigation of wound. This also mention in *Uttarsthan* chapter-1 for protection of newborn, infant.

Astang sangraha Uttarsthan chapter-8 contains many formulations which appear consisting of natural biocides & fumigants to cure various infantile *Grahabadha* (pardiatic idiopathic syndrome).

Sr.No	Name	Latin Name	Active Ingredient	Activity	Journal name
1	<i>Nimba</i> ^{20,21}	<i>Azadiracta Indica</i>	Azadirachtin, Quercetin, Catechin 	Insecticidal, Antibacterial, Antifungal	Mohammad Zahirul Islam, Original scientific paper UDC 635.64-23/- 24:632.9(519)
2	<i>Sarshap</i> ^{22,23}	<i>Brassica Campesteris</i>	Polyphenols, Tannins, Saponins	Antibacterial	Milin K. Agrawal International Journal of Advanced Research (2013), Volume 1, Issue 5, 131-135
3	<i>Guggul</i> ²⁴	<i>Commiphora Mukul</i>	Quinic acid, Myo-inositol	Anti Influenza A & B, Anti helminth	Ragavi R, Saritha A Surendran. Commiphora mukul: An Overview. Research J. Pharm. and Tech 2018; 11(7): 3205-3208. doi: 10.5958/0974-360X.2018.00589.9

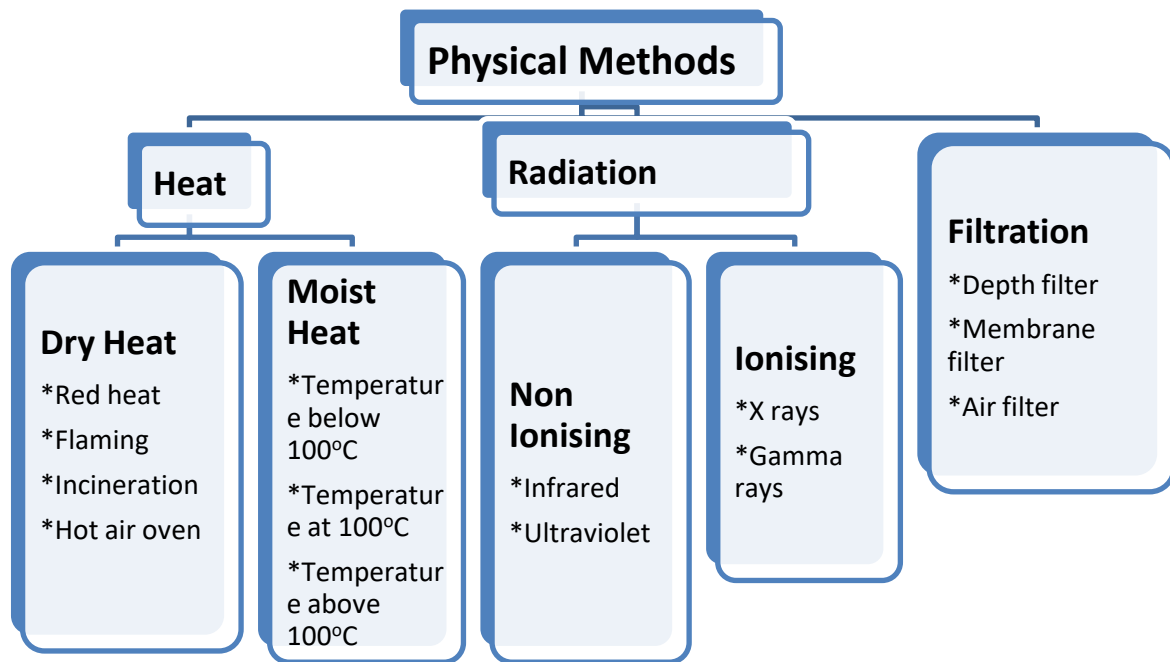
4	<i>Ela</i> ^{25,26}	<i>Elettaria Cardmomum</i>	Alpha terpineol, Limomene, Eucalyptol	Antimicrobial , Antirepellant, Insecticidal	Purshotam Kaushik, Iran J Pharm Res. 2010 Summer; 9(3): 287–292. Received 2008 Sep; Accepted 2009 May.
5	<i>Haridra</i> ^{27,28}	<i>Curcuma Longa</i>	Curcumin	Antibacterial, Antifungal	Niamsa, N. ; Sittiwet, C. Journal of Pharmacology and Toxicology 2009 Vol.4 No.4 pp.173-177 ref.18
6	<i>Jatamansi</i> ^{29,30}	<i>Nardostachys Jatamansi</i>	Ursolic acid, Oleanolic acid	Antiviral	Surendra Kumar, Vol 5, issue 3, June 2012, pages 112-118 (Journal of acupuncture & meridian studies)
7	<i>Tulasi</i> ^{31,32,33}	<i>Ocinum Sanctum</i>	Ethanoic acid, Chavicol, Linalool	Antibacterial, Antifungal	Agraval pooja Nagesh Indian Journal of Dental Research, Jul-sep 2010, vol 21, issue 3, page 357-359

In Modern Era:

In era of 18th century, in 1847 the Hungarian physician Ignaz Semmelweis 1st mention the importance of cleanliness in surgery. He is known as pioneer of Antiseptic procedures. His hypothesis that there was only one cause for puerperal fever in women, that all mattered was cleanliness, was extreme at that time & was largely ignored & rejected. In the same era, the British surgeon Dr. Joseph Lister promoted the idea of sterile surgery. He successfully

introduced Carbolic acid (Phenol) to sterile surgical instruments & to clean wounds. In 1843, Sir Oliver Wendell Holmes said about “Germ Theory of Disease – that the cause of puerperal fever.” He believed that bed sheets, washcloths & article of clothing were of particular concern in this regard. Later on, many more new techniques, methods of sterilization, asepsis & antisepsis are developed.

Methods of Sterilization:



Chemical methods :

- ✓ Alcohols: Ethyl, isopropyl
- ✓ Aldehydes: formaldehyde, glutaraldehyde
- ✓ Phenols
- ✓ Halogens
- ✓ oxidizing agents
- ✓ Salts
- ✓ Dyes
- ✓ Gases: ethylene oxide, Formaldehyde



- With anti-bacterial paint - has minimum durability of 15 years.
- Seamless.
- Easy to clean steam cleaned, electro metric (ideal for high humidity areas) .
- Vapor permeability (allows substrate moisture to escape) protects against growth of bacteria, mould and yeasts
- Moisture resistance, freeze / thaw resistance.

While constructing the operation theater some features are followed which are as follows:

- A continuous flow of highly filtered 'bacteria-free' air is reticulated under positive pressure into the operating field and air contaminants generated during surgery are removed from the site.

Conclusion:

It can be evident that the maximum drugs mentioned in ayurvedic texts 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 of disinfections, sterilization & aseptic precautions which have been used at that time. By the times 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 necessary to have more detailed & systemic evaluations of ancient method used for sterilization in pharmacodynamic & phytochemical view.

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