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A Correlative Study of Dead Body Preservation (*Mritsanrakshan*) Described in Literatures of *Ayurveda* with Contemporary Knowledge of Anatomy

Seema Verma[1*], Kameshwer Nath Singh[2], Shiv Ji Gupta[3] and Ashutosh Kumar Pathak[2]

[1]Department of Rachana Sharir, Government Ayurveda College Bharatpur– 321001, Rajasthan, India; seemaverma011994@gmail.com
[2]Department of Rachana Sharir, Faculty of Ayurveda, IMS BHU, Varanasi – 221005, Uttar Pradesh, India
[3]Department of Shalya Tantra, Faculty of Ayurveda, IMS BHU, Varanasi – 221005, Uttar Pradesh, India

Abstract

Human anatomy is the science that deals with the structure of the human body. The term anatomy is derived from the Greek word "anatome", meaning cutting up. Study of anatomy both theoretically and practically to fully understand the body. Dissection is the base of practical knowledge of human anatomy for medical students and before the dissection; there is a need for preservation of the dead body. *Acharya Sushruta* was the first physician and surgeon who dissected a human dead body in the ancient era. The *"Jalnimajjan Padhhati"* of *Mritsanrakshan,* a hydrobiological method of preserving dead bodies, was imparted by *Acharya Sushruta*, the father of surgery, in *Ayurveda* around 1500 years before B.C. *Acharya Sushruta* has used natural materials which are found anywhere easily and described the detailed structure of the human body from external to internal, seven types of skin (*Twacha* and *Kala*) etc. In the modern era, dead body preservation is done with the prepared solution of various chemicals. This process is called embalming. *Acharya Charaka* mentioned that knowledge of *Sukshm* and *Sthul Sharir* is very necessary for the *Sharir Rachana*. *Acharya Sushruta* is the foremost authority on the anatomical structures of the human body. He has provided comprehensive details on every body component described in *Ayurvedic* literature, specifically with *"Sharire Sushruta Shreshta."*

Keywords: *Ayurveda*, *Acharya Sushruta,* Dissection, Embalming Process, *Mritsanrakshan*

1. Introduction

According to *Acharya Sushruta*, it is not possible to see with the (physical) eyes the very minute *Vibhu* (*Atma* or soul) in the body, it can be seen with *Gyan Chakshu* (eye of knowledge) and *Tapas Chakshu* (eye of penance). But nowadays dissection of internal structures, histology (slides of organs), electron microscopic study, etc. may be part of the *Gyan Chakshu* (eye of knowledge)[1].

The physician/surgeon desiring to have the precise information of *Shalya Shastra* (Surgical science) should completely look at all parts of the dead body after its proper preservation. Practical knowledge along with theoretical knowledge is very essential.

2. Aim and Objective

- To elaborate on the human dead body preservation method described in *Ayurveda* and modern.

**Author for correspondence*

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- To elaborate on the scientific interpretation of dead body preservation mentioned in *Sushruta Samhita* and describe the comparison between *Ayurveda* and modern preservation techniques.

3. Materials and Methods

This is the conceptual type of study. All source material is collected and compiled from various available *Ayurvedic* classics texts like *Sushruta Samhita, Charak Samhita,* Dr Bhaskar Govind Ghanekar and available commentaries. Some relevant articles are also searched from multiple websites. After that, all matter is analyzed for discussion and draw some conclusions.

4. Discussion

4.1 There are a Few things that are Very Important for the Preservation of a Dead Body

- The dead body contains all body parts.
- A prolonged illness does not cause the death.
- Death is not caused by poison.
- The age of the dead body is less than 100 years.

Preservation material[2]

- Extreme cold rivers slow-flowing water
- Bambu cage
- *Munja*
- *Kusha (Dharbha)*
- *Chhal (Valkala)*
- *Shana*

4.2 Scientific Interpretation of Dead Body Preservation Method[3,4]

***Samastagatram*:** The human body should have as many organs and components as it should have. The entire body of a human being has a counterpart, that is no part of his body is less and neither is it distorted.

***Avishopahitam*:** On the death of poison, the organs which are affected by poison become unnatural, so should not have died from poison.

***Adeerghavyadhipeeditam*:** Body parts and *Dhatus* get damaged when suffering from chronic diseases like skin getting spoiled in leprosy, the bones of the nose and other places are damaged in syphilis, there is an eruption, spleen in Kala-Azar etc. Therefore, seeing the body of a dead man with disease will distort the understanding of these organs. If there is a short duration of the disease in case of death from long-term or new disease, there are no special changes in the body, therefore, the meaning of long-term disease sufferer who died due to famine from the disease. Must do so.

***Avarshashatikam*:** The body is not very old. In old age, the body's *Dhatus* and components decay - bones become somewhat light, sparse and awful in old age, teeth fall all over, the shape of the non-body changes, the uterus shrinks in women and its face becomes small, etc.

***Nisrushtaantrapureesham*:** Who's intestine and faeces have both come out. *Acharya Haranachandra* explains whose intestine has been removed along with stool. With this, the length of the intestine will also be known. Additionally, it is necessary to cleanse the body before rotting. Therefore, it is necessary to clean the intestine.

***Purusham*:** At that time, the male body was easily available rather than the female.

***Avagahntyamaapgayamnibadhhampanjarastham*:** The dead body should be kept in such type of river which has abundant water but the speed of flow is not fast. The body should be immersed in water, so it is kept tied in the river. And it was kept in a cage to protect it from aquatic organisms. The cage of the dead body was kept tied.

Munjavalkalkushshanadinam anyatamen aaveshtita angpratyangamaprakashdeshe kothayet: The body was wrapped with any one of these plants to protect it from aquatic organisms: *Munja, Valkala, Kusha, Shana,* etc., and left to rot for seven days in an intact area.

There are several reasons for mentioning these specific plants[5].

- ***Munja*** – *Saccharum munja* Roxb – Gramineae (*Shar*). It is a source of natural fibre. So, it is used to wrap dead bodies.
- ***Valkala*** – There are five astringents under the term *Valkala*. They are *Nyagrodha* (*Ficus bengalensis* Linn. - Moraceae), *Udumbara* (*Ficus glomerata* Roxb. - Moraceae), *Ashvattha* (*Ficus religiosa* Linn. - Moraceae), *Pareesha* (*Thespesia populnea* Soland.- Malvaceae) and *Plaksha* (*Ficus lacor* Buch. Ham. - Moraceae).

These are described as 'Antiseptic', 'Anti-inflammatory', 'Antibacterial', 'Antimicrobial', 'Wound Cleansing' and 'Healing' astringents which help in dead body preservation. *Acharyas* mentioned *Valkala* to envelop the body, preserving it.

- All these 5 plants contain tannins.

- *Panchavalkala* is *Shothahar* (which diminishes swelling) and *Vranaropaka* (which helps in wound healing).
- ***Kusha*** – Desmostachya bipinnata Stapf – Graminae (*Suchyagra, Yagyabhushan)*
  - In both Gram-positive and Gram-negative infections, *Kusha* has antibacterial action. Consequently, *Kusha* shields the corpse from bacterial degradation.
- ***Shana*** – *Crotalaria juncea* Linn. - Leguminosae
  - A natural fibre source is it. *Ayurvedic* and folk medicine both employ it as an astringent. The enlarged tissues of the deceased corpse are lessened by this characteristic. There is evidence of strong antibacterial activity in plants belonging to the genus Crotalaria.[5]

Samyak prakuthitam ch udhrutya tato deham saptaratrat: After 7 days, remove the body from the cage.

Ushir balvenu Valkala Koorchaanam Anyatamen shanai shanai Avgharshyamstvagadin sarvaaneva bahyaabhyantarang visheshan yathoktan lakshayechchkshusha: Using a brush of *Usheer, Baal, Venu, Valkala,* go slowly and pay attention to all of the body's internal and exterior organs[3,4].

The reason for rubbing the dead body with the assistance of the brush may be to see minute body parts separately like layers of skin[6].

5. Modern

5.1 The Anatomy Act[7]

Definition: As per the Anatomy Act, unclaimed deceased person's remains may be supplied to hospitals and medical education facilities, as well as individuals may donate their bodies or any portion of them before death.

Unclaimed body: It refers to a deceased person's body for whom there is no living relative or whose corpse has not been claimed by any living relative within the allotted time.

Embalming: The treatment of a dead body to sterilize it or to protect it from decay. For practical as well as theoretical reasons a well-preserved body has long been a chief mortuary concern.

History of embalming: Embalming has a very long and cross-cultural history consisting of several different periods. Egypt is considered the country where embalming began over 5,000 years ago. It has been suggested that about 730,000,000 bodies were mummified in Egypt, probably between 400 B.C. and 700 AD, because the ancient Egyptians believed that mummified preservation strengthened the soul after death, which returned to the preserved body[8].

Instruments

- Glass pot
- Cannula
- Thread
- Surgical blade
- Scalpel and Scalpel handle
- Forceps (Blunt and Sharp)
- Scissor

Embalming Methods[10]: Different techniques were used for embalming the body in ancient times and today to prevent decomposition. These include:

1. Mummification
2. Arterial embalming
3. Cavity embalming
4. Surface embalming
5. Hypodermic embalming
6. Plastination
7. Cryopreservation
8. Thiel embalming method
9. Saturated salt solution

5.2 The Procedure of Embalming (Arterial Embalming)

Firstly, the cadaver is washed with normal water and cleaned. The dead body is lying in the supine position on the dissection table in the dissection hall, its right or left side having an inguinal ligament between the anterior superior iliac spine and the pubic tubercle. Make the incision less than 4 cm below it. The lateral side of the femoral sheath contains the femoral artery, whereas the medial side contains the femoral vein. The dead body is preserved by being sent to the preservative fluid in body through the femoral artery. It keeps the deceased from the left common carotid artery[11].

5.3 Importance in the Medical Field

- Today, cadavers are used in medicine and surgery to increase knowledge of gross human anatomy[12].

- Surgeons dissected and examined living patients who died before surgical procedures to detect possible abnormalities in the surgical area of interest[13].
- New types of surgical procedures can cause many procedural obstacles that can be removed with prior knowledge of dissection[14].

6. Discussion

Table 2 reveals that the method of body preservation described by *Acharya Sushruta* is very scientific. He described the *Ayurvedic* plants in *Shava Sanrakshan Vidhi* (body preservation) i.e., *Munja, Valkala, Shana* etc. that have similar action with embalming fluid in new modern science.

Acharya Sushruta described that the body should be kept in a bamboo cage wrapped by *Munja, Valkala, Shana,* etc which was useful for prevention from other infections, water animals, bacteria and viruses etc. and helpful in proper body preservation. But in the new era, the body is kept in more sophisticated instruments like a formalin chamber, A.C. Mortuary, etc., after insertion of embalming fluid through an embalming process which is also helpful in proper body preservation.

Table 1. Showing embalming fluid composition[9]

S.N.	Embalming fluid	Amount	Action
1.	Formalin	4 litres	Biocide, germicide, disinfectant and also effective against fungi and many viruses.
2.	Water	4 litres	Solvent
3.	Methyl alcohol	1 litre	Hold the formaldehyde in the solution.
4.	Glycerine	500 ml	Absorbs and retains moisture and holds the formaldehyde gas.
5.	Cetrimide	500 ml	Bactericidal against gram-positive as well as gram-negative organisms. It has variable antifungal activity and is effective against some viruses.
6.	Eosin	25 ml	Cosmetic effect.
7.	Eucalyptus oil	25 ml	Mask the odours.

Table 2. Showing the Action of embalming fluid and *Ayurvedic* preservative materials used in body preservation

SN.	*Ayurvedic* preservative material	Action	Embalming fluid	Action
1	*Munja (Saccharum munja)*	Antioxidant activity[15]	Formalin	Germicide, disinfectant, antifungal, antivirus
2	*Valkala-* • *Nyagrodha (Ficus bengalensis)* • *Udumbara (Ficus glomerata)* • *Ashvattha (Ficus religiosa)* • *Pareesha (Thespesia populnea)* • *Plaksha (Ficus lacor)*	Antiseptic, anti-inflammatory, antioxidant[16], antibacterial, antimicrobial and cosmetic effect[17].	Methyl alcohol	Hold the formaldehyde in the solution
3	*Kusha (Desmostachya bipinnata)*	Antioxidant, antibacterial effect against gram-negative and gram-positive pathogens. Protecting the dead body from putrefaction by bacteria[5,15].	Glycerin	Hydrate the tissue, moistness
4	*Shana (Crotalaria juncea)*	Shrinking swollen tissues of the dead body, antimicrobial activity[5].	Cetrimide	Bactericidal against gram-positive as well as gram-negative organisms. It has variable antifungal activity and is effective against some viruses.
5	Slow flowing river	Hydrate the tissue	Water	Solvent
6	–		Eosin	Cosmetic effect
7	–		Eucalyptus oil	Mask the odours

7. Conclusion

The procedure of dissection provides a thorough explanation of body collecting and preservation. Essentially, then, the technique that *Acharya Sushruta* prescribed for *Mritasanshodhan* (the preservation of human body) is grounded in science. According to the *Sushruta Samhita*, keeping the body in the water, and wrapping the body in particular plants, leave the body for seven days in the water with plants and after that dissect the body by using one of the brushes (*Usheer, Baal, Venu* etc.) has a very scientific reason.

Using *Ayurvedic* plants in preservation method and embalming fluids, both actions are similar which indicates the scientific vision of *Acharya Sushruta.*

Dissection of internal structures, histology (slides of organs), electron microscopic study etc. may be part of the *Gyan Chakshu* (eye of knowledge).

Before preservation, *Acharya Sushruta* mentioned that the intestine should be removed along with faeces. It may indicate that the first started the abdomen dissection.

The modern method of chemically treating a deceased person's body to lessen the development and presence of microbes, slow down organic deterioration, and restore a respectable physical look is called embalming. It has various types of techniques. One can say, that both *Ayurveda* and modern explained the dead body preservation method in a very different way. In *Ayurveda*, the body preservation method is simple and natural which has no side effects. But in modern techniques by using different chemical agents which is harmful to us, body decomposition on the dead body and it is very costly.

But practically, the method of dead body preservation described by *Acharya Sushruta* cannot be followed completely. In the present scenario, modern techniques of the embalming process are used.

Knowledge of anatomy and dissection is necessary for surgical, radiological, histological, and clinical, research and improves the healthcare system's point of view by producing new scientific data.

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