

THE HYDRO - BIOLOGICAL METHOD OF PRESERVATION AND DISSECTION OF HUMAN CADAVER GIVEN IN SUSHRUTA SAMHITA: A SCIENTIFIC INTERPRETATION

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Abstract

One should study anatomy theoretically as well as practically to acquire complete knowledge of body. Practical study of anatomy includes dissection of a human cadaver. Modern medical science has given many methods of dead body preservation. Likewise, in *ayurveda*, 1000-1500 before B.C. *Sushrutacharya* has given a particular technique for dead body preservation which can be grossly called as "*Jalnimajjan padhhati*" of *mritsanrakshan* (hydrobiological method of dead body preservation). In ayurvedic texts, there is a reference "*sharire Sushruta shreshtha*" means *acharya Sushruta* is the best in describing anatomical structures of human body as he has given the detailed information about each and every body part. *Acharya Sushruta* has revealed seven layers of skin with their thickness and seven types of *kalas* (membranes) with their sequence. This was possible for him only because of detailed dissection. Well preserved human cadaver is needed for detailed dissection. Hence, he has mentioned this particular method. In this article, effort is made to give the scientific interpretation of dead body preservation method given by *Sushrutacharya*.

Keywords:

Hydro-biological method, *ayurveda*, *Sushrutacharya*, *Jalnimajjan padhhati*, *mritsamrakshan*, *Kalas*.

Introduction

Anatomy is the basic and important subject of medical science. As it is said that strong basement is the foundation for strong building, like that one cannot become a good medical practitioner without knowing the complete anatomy of human body. Thousands of years ago, *acharya Sushruta* has said that one who intends to acquire definite knowledge of surgery should study anatomy practically by dissecting dead body properly¹. Surgeon should know anatomical structures to avoid injury of vital structures (arteries, veins, nerves) and complications during surgical procedure. He mentioned that whatever is practically seen and whatever is known from scripture that both combined together develops the knowledge further². One should adopt the method of combining theoretical and practical knowledge while practicing in medical field.

Acharya Sushruta has mentioned many criterions which should be fulfilled while selecting and preserving dead body. These criterions include –dead body should be with all body parts, poisoning must not be the reason of death etc.

Acharya Sushruta knew that dissection is must for medical student for practical knowledge of anatomy, hence he has explained method for preservation and dissection of cadaver. We should understand the reasons behind giving this particular method.

Aim and objectives

1. To study the method of dead body preservation given in *Sushruta samhita* thoroughly.
2. To study the scientific interpretation of method mentioned by *aacharya Sushruta*.

Material and methods

Textual references from *ayurvedic* classics like *Sushruta samhita*, *Ghanekar commentry* etc. and some article references were used for this study.

Scientific interpretation of dead body preservation method

Sushruta has given many criterions while giving this method. Below from here, each criterion with interpretation is given.

1. Samastagatram:

To acquire complete anatomical knowledge the dead body should be with its whole *angapratyangas*(parts). Means all body parts should be in their natural numbers. There should be no deficit or extra or defective part³.

2. Avishopahatam:

Different types of poisons affect different body parts. The affected part does not remain natural and wrong knowledge is gained when we dissect such type of body. Hence, poisoning should not be the reason of death. Hence, person not died of poison should be selected for preservation⁴.

3. Adeerghavyadhipeeditam:

Chronic diseases can cause destruction of body parts like – skin is destructed in leprosy, nasal bone and some other bones in syphilis, penis in gonorrhoea, splenomegaly occurs in kala-azar etc. So, if dissection of such body is carried out it can give false knowledge. Dead body should be of *adeerghavyadhipeeditam*(without chronic disease) person means if death has occurred due to any acute disease then such body can be taken as acute disease affects no or little body part⁵.

4. Avarshashatikam:

The dead body should not be of a very old person as old age causes degradation of some body parts. For example, in old age bones become weak, teeth fall down, shape of lower jaw changes, in female body uterus shrinks. Word to word meaning of *avarshashatikam* is age should not be equal to or above 100 years. This meaning is correct for *Samhita* period as at that time average age level was very high. But nowadays average age level is decreased so meaning of *avarshashatikam* should be taken as not of very old age instead of 100 years⁶.

5. Nirushtaantrapuresham:

Before preservation of dead body, intestines should be removed along with faces as intestine is the main site for bacteria. These bacteria favor early decomposition of dead body. So, initial removal of intestines fulfills two objectives. First one is removal of intestinal bacteria along with faeces and second is intestines are made available for measuring their length⁷.

6. Purusham:

At that time, male body can be made easily available as compared to female body⁸.

7. Avagahntyamaapgayam:

- The dead body should be kept in such type of river which has abundant water but flows slowly. One of the reasons for keeping the dead body in water is to keep skin moist and soft and decomposition is slower in water due to early cooling of the body⁹.
- *Sushrutacharya* has mentioned that dead body should be kept in flowing water. There is a scientific reason behind this as decomposition is slower in flowing water than in stagnant as flowing water constantly washes out the organisms from the surface of body¹⁰.

8. Nibadhham:

Body should be kept tied so that it should not drown and always remain under water¹¹.

9. Panjarastham:

Dead body should be kept in a cage to protect it from aquatic animals like crocodile¹².

10. Munjavalkalkushshanadinam anyatamen aaveshita angpratyangam:

Body should be wrapped by using one of the plant like *munja*, *valkal*, *kush*, *shana* etc. There are two purposes behind this –

- To protect body from small aquatic animals like fishes¹³. As fish may cause postmortem injury or mutilation of the dead body which will favour the process of decomposition by allowing invasion of the body by organisms, through the injuries or mutilated areas¹⁴.
- To make the skin of dead body soft so as it's dissection will be easy¹⁵.

Also there may be some other reasons for mentioning these specific plants.

- ❖ *Munja* – *Saccharum munja* Roxb – Graminae (*Shar, Tirkande* in marathi)
 - It is a source of natural fibre¹⁶. So it has been used to wrap the dead body.
- ❖ *Valkala* – 5 astringent plants are to be considered under the term *valkala*. They are *Nyagrodha* (*Ficus bengalensis* Linn.- Moraceae), *Udumbara* (*Ficus glomerata* Roxb.- Moraceae), *Ashvatha* (*Ficus religiosa* Linn.- Moraceae), *Pareesha* (*Thespesia populnea* Soland.- Malvaceae) and *Plaksha* (*Ficus lacor* Buch.Ham.- Moraceae).
 - It shows properties like antiseptic, anti-inflammatory, antioxidant, antibacterial, antimicrobial wound purifying and healing, and astringent¹⁷. As these properties help in dead body preservation, Acharyas have mentioned *Valkala* to wrap the dead body while preserving.
 - All these 5 plants contain tannins¹⁸.
 - *Panchavalkala* are *shothahar* (reduces swelling) and *vranaropaka* (helps in wound healing).
- ❖ *Kusha* – *Desmostachya bipinnata* Stapf – Graminae (*Suchyagra, yagyabhushan*)
 - *Kusha* possesses antibacterial effect against gram negative and gram positive pathogens¹⁹. This property of *Kusha* helps in protecting the dead body from putrefaction by bacteria.
 - Phytochemical analysis showed that tannins present in *Kusha*²⁰.

Plants containing tannins show astringent, antiseptic and toning properties²¹. Tannin containing plants when applied to dead matter, unite with gelatin of dead animal matter and forms solid insoluble compound which resist the action of water and does not putrefy²². Tannins have been reported to have anti-viral, anti-bacterial and antiparasitic effects. The ability of tannins to form a protective layer over the exposed tissue keeps the wound from being infected even more²³. Due to above properties tannins containing plants help in preservation of dead body.

- ❖ *Shana* – *Crotalaria juncea* Linn.- Leguminoaceae (*Taag* in marathi)
 - It is a source of natural fibre²⁴.
 - In the folk and Ayurvedic medicines, It is used as astringent²⁵. (tends to shrink body tissue). This astringent property helps in shrinking swollen tissues of dead body.
 - Plants of genus *crotalaria* have been found to possess significant antimicrobial activity²⁶.

11. *Aprakashdeshe kothayet:*

Body should be made to decompose in a dark area. Meaning of dark area should be taken as that area where people hardly go. This help in avoiding use of that water by people in which dead body is dipped²⁷. This also protects the dead body from turbulent people²⁸.

12. *Samyak prakuthitam ch udhrutya tato deham saptaratrat:*

After a week, when the body is fully decomposed it is taken out²⁹.

13. *Ushir bal venu balvaja koorchaanaam anyatamen shanai shanai avgharshyanstvagadin sarvanech bahyaabhyantarangpratyang visheshan yathokran lakshayechchkshusha:*

Slowly rubbed with brush of one of ushira, hair, bamboo and balvaja while observing all parts and sub-parts, external as well as internal³⁰. Purpose of rubbing the dead body with the help of brush, may be to see minute body parts separately like layers of skin³¹.

Conclusion

Hence, from above all, it can be said that the method *acharya Sushruta* has given for *mritasanshodhan* (preservation of human cadaver) has a scientific base. Keeping the dead body in water has also scientific reason. Even while selecting the plants for wrapping the body, he has selected those particular plants having properties which help in preservation of body. Keeping in mind the all above scientific principles, thousands of years ago, *Sushruta* has stated that particular hydro-biological method of preserving and dissecting cadaver.

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