

EXTRACTION OF FIBRE FROM ASHMAN TAKA (*Bauhinia racemosa*, Lam) TO MAKE IT AN ACCEPTABLE SUTURING MATERIAL AND ITS MECHANICAL PROPERTIES

Deepika T. K¹, Siddayya Aradhyamath²

¹PG Scholar; ²Professor and HOD;

Dept. of Shalya Tantra, JSS Ayurveda Medical College, Mysore, Karnataka, India

Email: Drdeepika68@gmail.com

ABSTRACT

Suture materials are used to facilitate closure and healing of surgical or trauma induced wounds by upholding tissues together to facilitate healing process. Recently, there is a growth in classes of suturing materials based on their properties and capabilities to improve tissue approximation and wound closure. Acharya Sushruta practiced *Sivana Karma* using different plant and animal origin sutures. *Ashman taka* (*Bauhinia racemosa*, Lam.) is one among the plant origin suture materials. Modern natural sutures mainly used are surgical silk, linen and cotton. The handling and knot tying characteristics of silk suture remains standard even today. Synthetic suture materials have become popular due to better advantages over natural sutures as they are consistent in their appearance, performance and degradation. Despite millennia of experience with wound closure biomaterials, no study or surgeon has yet identified the perfect suture for all situations. Tissue characteristics, tensile strength, reactivity, absorption rates, and handling properties should be considered when selecting a wound closure suture. In Ayurveda many surgeries had been out, but the necessary equipments like suturing during surgery lacking behind. Hence, in this study efficacy of fibers of *Ashman taka* (*Bauhinia racemosa*, Lam.) as suturing material in present day surgical practice been evaluated.

Keywords: *Ashman taka*, Suture material, *Sivana*.

INTRODUCTION

Suture means to “sew” or “seam”. In surgery suture is the act of sewing or bringing tissue together and holding them in apposition until healing has taken place.

A suture is a strand of material used to ligate blood vessels and to approximate tissues together.

Sushruta used word *Sivana*, means suturing, and one among *Asthavidha sastra karma*. In *Asthavidha*

Sastrakarmiya Adhyaya of Sushruta Samhitha, Acharya Sushruta has mentioned *Sivana karma* in detail and different plant and animal origin suturing material used for this purpose¹. Suture act as a foreign body. An ideal suturing material should produce least tissue reaction. The other essential character like tensile strength, capacity to sustained sterili-

zation process should be easy to handle, having good knotting property.

The earliest reports of surgical suture date to 3000 BC in ancient Egypt, and the oldest known suture is in a mummy from 1100 BC. A detailed description of a wound suture and the suture materials used in it is by Indian sage and surgeon Sushruta written in 500BC.

Ashman taka (Bauhinia racemosa, Lam.) has been identified by *Dalhana* as "Kovidara sadrusha" and *yamala patraka*" meaning there by *Ashman taka (Bauhinia racemosa, Lam.)* is a tree whose leaves are just like *Kanchanara*²

In *Charaka Samhita Ashman taka (Bauhinia racemosa, Lam.)* is mentioned in *Mutrasangrahaniya* and in *Vimana sthana* it is included under *Amla skanda*³.

Acharya *Charaka* mentioned *Ashman taka (Bauhinia racemosa, Lam.)* in *Phalini, Moolini* further he adds "Vamane Ashman takam Vidadath" means it is used for Vomiting⁴.

Commentator *Chakrapani* has identified *Ashman taka (Bauhinia racemosa, Lam.)* as *Amla Kota*⁵.

DRUG REVIEW⁶:

Sanskrit Name: *ASHMAN TAKA*,
Botanical name: *Bauhinia racemosa*,
Family: *Fabaceae*,
Genus: *Bauhinia*

VERNACULAR NAMES

Hindi: "Katmauli",
Kannada: "Aapta",
Malayalam: "Arampaali",
Tamil: "Atti",
Telugu: "Tella",
Bengali: "Banraji",
Marathi: "Apta",
Sanskrit: "Yamalapatraka",
English: Camels foot climber, Maloo creeper.

HABITAT

Ashman taka (Bauhinia racemosa, Lam.) commonly known as "bedi" leaf tree is a rare medicinal species of flowering shrub with religious significance. It is native to tropical south East Asia.

MORPHOLOGY:

A small deciduous tree, up to 12 meter, bark grey to black, rough, thinly scaly, with numerous vertical cracks. Leaves simple, bilobed, alternate, stipules small cauducous. Petiole 10-33mm long, slender, pubescent, swollen at base and at tip.

Flower- bisexual, 10-12mm across, yellowish white, in terminal and leaf opposed few flowered racemose. Fruit a pod 15-22*1.5-2cm, oblong, blackish brown, turgid, apex horned indehiscent. Seeds 10-20 ovoid.

FLOWERING SEASON: March to June,

FRUITING SEASON: November and December.

DRAVYA GUNAKARMA.,

Rasa - Kashaya,

Guna-Laghu,

Veerya-Sheeta,

Vipaka - katu, Doshakarma-Kaphapittahara

CHEMICAL CONSTITUENTS: Phenols, Saponins, Flavonoids, Glycosides, Tannis, Methanol.

USEFUL PART: Stem, leaf, bark.

USES:

Leaves are used in "Headache and Malaria",

Bark decoction is used in "Infected Skin diseases",

Flower decoction is used in "Cold and Cough".



Ashman taka plant

THREAD PREPARATION

Details of method of extraction of *Ashman taka* (*Bauhinia racemosa*, Lam.) fibers for suture material are not available in Ayurvedic literatures, therefore fibers were extracted according to the present methods used for plant fiber extraction.

COLLECTION OF BARK:

1. Barks of *Ashman taka* (*Bauhinia racemosa*, Lam.) were cleansed with tap water, so as to free it from dust and mud particles.

OBSERVATIONS

- Too young bark does not yield fibers.
- Over mature bark yields adherent strands of fibers which were very difficult to isolate.
- Bark with straight erect needs to opt to obtain long fibers.

RETTING⁷:

It is the stage in the manufacturing of plant fibers which employs water and microbial action to separate the bast fibers from the woody core. Cleansed *Ashman taka* (*Bauhinia racemosa*, Lam.) barks were completely immersed in container with clean water and then stored in clean environment devoid of pollution.

OBSERVATIONS:

- Water retting utilizes enormous amount of water for the process and water needs to be changed on daily basis. Long bark demands big and long container to allow proper retting. Water is changed on daily basis, because microbial action and putrefaction of debris, emits foul smell.
- Before immersing the bark into fresh water next day, each bark is gently rubbed over its surface to clear off the loose and slimy debris. Daily change of water and removal of loose and slimy debris is carried daily for until strands of *Ashman taka* (*Bauhinia racemosa*, Lam.) fibers emerge on the bark surface.

ISOLATION OF ASHMAN TAKA FIBERS:

Single strands of *Ashman taka* (*Bauhinia racemosa*, Lam.) fibers were difficult to separate. Obtained strand was inspected for adherent debris; debris was

removed by rubbing gently. Then fibers were rinsed in fresh water.

Many Fibers were twisted each other to make a single strand and placed on a dry and clean cloth in shade and allowed to dry for 2-3hrs. After drying, it was stored in a polythene cover and preserved.

OBSERVATIONS

- *Ashman taka* (*Bauhinia racemosa*, Lam.) fibers were fragile and highly prone to breakage.
- **Length:** maximum length of fibre obtained was 10-12cm, many fibers are twisted each other and made into single strand of 30cm
- **Color:** Creamish white
- **Texture:** smooth. Important Physical properties namely tensile strength and diameter was measured in CSTRI, central silk board, Bangalore.

PREPARATION OF ASHMAN TAKA (*Bauhinia racemosa*, Lam.) THREAD "SUTURE MATERIAL".

Many filaments of *Ashman taka* (*Bauhinia racemosa*, Lam.) fibers of equal length which were obtained by retting process were held together at its one terminal end are twisted firmly. Twisted end is fixed by inserting it to cut end of rubber tube to maintain the grip on twisting the whole length of filaments together to form the thread. Whole length of filaments are twisted and wound around the rubber tube simultaneously, maintaining firm grip and equal tension throughout. Free end of suture is inserted into the cut end of rubber tube and fixed. Terminal portions with fraying ends are trimmed off to obtain sharp end.

PHYSICAL PROPERTIES:

Length: 60cm,
Single filament sizes vary in sizes. Long filaments are difficult to obtain.,
Color: Creamish white,
Texture: smooth,
Tensile strength: 8.8MPa,
Breaking Load: 9.8N,

Elongation (%): 1.85,
Diameter: 0.08- 0.4mm.

METHODS OF STERILIZATION:

Autoclaving, Sterilization of *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread was achieved by subjecting the twisted sutures over the rubber tube for autoclaving. After autoclaving, it is stored in sterile steel container.

PHYSICAL PROPERTIES AFTER AUTO-CLAVING:

Ashman taka (*Bauhinia racemosa*, Lam.) suture thread tolerates well this method of sterilization. Some difference was observed in physical properties.

Length: 60cm,
Color: Creamish white,
Texture: smooth,
Tensile strength: 9.1MPa,
Breaking Load: 10.4
Elongation (%): 1.85,
Diameter: 0.3mm



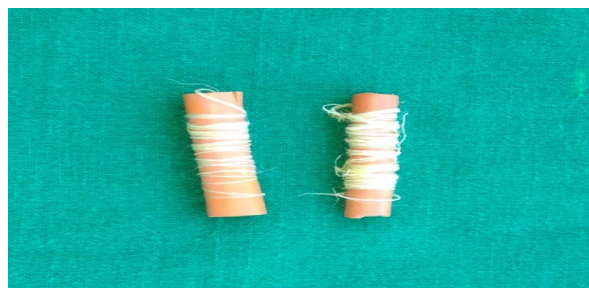
Ashman taka bark immersed in water to achieve retting.



Fibers of *Ashman taka* achieved after retting.



Fibers of *Ashman taka* after drying



Fibers of *Ashman taka* after autoclave

Table 1: SHOWING DIFFERENCE IN DIAMETER OF *ASHMAN TAKA* (*BAUHINIA RACEMOSA*, Lam.)

<i>Ashman taka</i> hread	Before autoclave	After autoclave
Diameter	0.08-0.4mm	0.05-0.3mm
Breaking load	9.8N	10.4N
Elasticity	1.85%	1.85%

Diameter of *Ashman taka* suture thread before autoclaves ranges from 0.08-0.4mm which reduced to 0.05-0.3mm after autoclave.

Breaking Load of *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread was 9.8N before autoclave, which increased to 10.4N after autoclaving.

Elasticity of *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread is 1.85% before autoclave which remained same after autoclaving.

DISCUSSION

Incised wounds are very common wounds handled in day today life found in many road traffic accident, fall, and assault. These wounds are usually longer than they are deep. They need immediate treatment by suturing the ends to avoid bleeding.

Acharya Sushrutha in *Sutra Sthana* mentioned about *Sivana Karma* and materials which can be used for this purpose. Hence this study was undertaken to justify the statement said by Acharya Sushrutha in *Sushrutha Sutra Sthana*.

PHYSICAL PROPERTIES OF *ASHMAN TAKA* (*Bauhinia racemosa*, Lam.)

Ashman taka (*Bauhinia racemosa*, Lam.) is a natural plant origin suture material and it may be included in class II sutures as per USP guidelines.

LENGTH:

There are no strict guidelines on length of sutures. For practical surgical utility, the length of single suture is determined by the depth of the wound. It should be sufficiently long enough to permit easy handling in both deep and superficial planes, knot placement and avoid interruption of frequent swaging into needle eye.

Standard routine surgical sutures are available in length of 76 cm with needle, 152 cm without needle and upto 300 meters reel in unsterile form. Fine sutures like catgut 6-0 and vicryl 6-0 to 3-0 are supplied in length of 38cm and 45cm respectively. Control suture in this study, surgical cotton thread is available in 22 meters reel in unsterile form which is divided as per the requirement and autoclaved and used for closure.

A minimum of 35 cm length suture is ideal for surgical situations. Routine average length yield of *Ashman taka* (*Bauhinia racemosa*, Lam.) thread is about 10 -20 cm, .On comparison with standard surgical sutures, *Ashman taka* (*Bauhinia racemosa*, Lam.) sutures are a step behind in this regard. This is due to manual preparation of *Ashman taka* (*Bauhinia racemosa*, Lam.) sutures.

DIAMETER:

The accepted surgical practice is to use the smallest diameter suture that will adequately hold the wound edges. This minimizes trauma on passage of sutures into tissues and ensures minimum mass of sutures is left in the body. The USP size is related to a specific diameter range necessary to produce a certain tensile strength. The smaller the size, the lesser is the tensile strength.

The diameter depends on number of fibers used to prepare the thread. The *Ashman taka* (*Bauhinia racemosa*, Lam.) suture was prepared by twisting of four monofilaments. Diameter was measured in CSTRI, central silk board, Bangalore.

COLOUR:

There was no colour change observed of *Ashman taka* (*Bauhinia racemosa*, Lam.) suture, during preparation, before autoclaving and after autoclaving. This shows that *Ashman taka* suture thread withstand the heat during autoclaving.

CONCLUSION

Ashman taka (*Bauhinia racemosa*, Lam.) fibers can be made an acceptable suturing material and it can be used in external wound closure.

- Raw materials of *Ashman taka* (*Bauhinia racemosa*, Lam.) are easily and available abundantly.
- *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread facilitate easy handling, exhibit good knot security, maintain optimum tensile strength so as to hold the tissues until primary healing occurs.
- The merits are raw material is available throughout the year, and demerits are retting procedure emits foul smell, preparation of sutures demands manual labor, quality of sutures varies depending on raw material qualities.
- *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread offers mild to moderate tissue drag and exhibits capillary action.

This study illustrated that physical properties of *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread are only a step behind the standard requirements. *Ashman taka* suture thread can be used as a safe alternative for cotton thread in skin closure. Thus justifies the use of *Ashman taka* (*Bauhinia racemosa*, Lam.) suture thread as surgical suture used by Acharya Sushruta.

REFERENCES

1. Sushruta; Sushruta Samhita, commentary "Nibandhasangraha" of Dalhanacharya and the Nyayachandrika Panjika of Sri Gayadasacharya on Nidanastana, edited by Vaidya Jadhavji Trikamji Acharya, published by Choukambha Sanskrit sansthan, Varanasi, reprint 2010, Pp-824,P-119.
2. Vaidya Bapalala, Some controversial drugs in Indian medicine, Third edition, Chaukamba Orientalia; 2010, pp-218.
3. Vaidya Bapalala, Some controversial drugs in Indian medicine, Third edition, Chaukamba Orientalia; 2010, pp-219.
4. Vaidya Bapalala, Some controversial drugs in Indian medicine, Third edition, Chaukamba Orientalia; 2010, pp-219.
5. Vaidya Bapalala, Some controversial drugs in Indian medicine, Third edition, Chaukamba Orientalia; 2010, pp-219.
6. <https://en.m.wikipedia.org/wiki/Bauhinia-racemosa>.
7. <http://www.votehemp.com/PDF/ages001E.pdf>

Source of Support: Nil

Conflict Of Interest: None Declared

How to cite this URL: Deepika T K & Siddayya Aradhyamat: Extraction Of Fibre From Ashman Taka (*Bauhinia Racemosa*, Lam) To Make It An Acceptable Suturing Material And Its Mechanical Properties. International Ayurvedic Medical Journal {online} 2018 {cited September, 2018} Available from: http://www.iamj.in/posts/images/upload/1875_1880.pdf