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Case Study

# A CASE REPORT ON THE EFFECT OF *VEERATHARADI GANA* IN THE MANAGEMENT OF PURPLE URINE BAG SYNDROME

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## ABSTRACT

Purple urine bag syndrome is a benign harmless condition with higher prevalence among individuals with long term indwelling Foleys catheter. In addition to extended catheter use and institutionalization, other risk factors include being female, having alkaline urine, and suffering from chronic constipation. This syndrome is also linked to urinary tract infections caused by bacteria that produce enzymes like sulphatase and phosphatase, which break down tryptophan. The resulting metabolites, indigo (blue) and indirubin (red), combine to create a purple colour, which is the characteristic feature of this condition. *Veeratharadi gana* mentioned in *Susrutha samhitha* is indicated in urinary disorders like *Ashmari, Sarkara, Mutrakrichra*, and *Mutraghata*. This case study deals with the case of a 28 years old male patient, with paraplegia following a fall from height, having loss of sensation below the umbilical region and catheterised, who had Purple Urine Bag Syndrome associated with urinary tract infection and was treated with *Veeratharadi gana Kashaya* as *Pana (*medicated drink). Following the administration of treatment, the urinary tract infection subsided, and the purple discoloration of the urine bag resolved, thereby demonstrating the efficacy of Ayurvedic medicine in the management of Purple Urine Bag Syndrome.

## INTRODUCTION

Purple Urine Bag Syndrome was initially documented in 1978. [1] It commonly occurs in patients with chronic catheter use and urinary tract infections, and was once considered uncommon. However, recent studies indicate that it affects 8.3%–16.7% of individuals with long-term catheterization[1].

PUBS occurs when the urinary drainage bag turns purple in patients with prolonged urinary catheter use, particularly those who are bedridden. This condition is linked to urinary tract infections caused by bacteria that produce indigo and indirubin pigments. This condition predominantly affects women and is commonly linked to alkaline urine, constipation, and a high bacterial load. The majority of individuals diagnosed with this syndrome are catheterized due to severe disabilities, with urine pH levels generally measuring 7.0 or above. Generally, intensive antibiotic treatment is not advised. The condition itself is usually asymptomatic and harmless. The primary sign is the purple colour of the urine drainage bag, which can be alarming but generally doesn't cause any additional symptoms like fever or discomfort. The purple coloration does not usually affect the patient's health significantly.

In Ayurveda, a group of drugs called *Veeratharadi Gana* is mentioned in *Sushruta Samhita Sutrasthana* 38th chapter *Dravya Samgrahaniya* for *Mutrajanya vikaras*. This *Gana* contains 18 plants as *Veeratharu, Sahacharadvaya, Darbha, Vrikshadani, Gundra, Nala, Kusha, Kasha, Ashmabheda, Agnimantha, Morata, Vasuka, Vasira, Bhalluka, Kurantaka, Indivara, Kapotvanga,* and *Shwadamshtra*. They are indicated in *Vata vikara, Ashmari, Sarkara, Mutrakrichra*, and *Mutraghata*[2]. This article is about one case of Purple urine bag syndrome which was effectively treated with

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*Veeratharadi gana thoya paka*, bringing new management opportunities from the field of Ayurveda.

## Case Presentation

### Patient Information

A 28 years old moderately built male patient with no history of type 2 diabetes mellitus (DM), Hypertension (HTN), Dyslipidemia (DLD) came to our OPD in 2024, with complaints of weakness and loss of sensation of bilateral lower limbs. He also complaints of purple discolouration of his urine bag associated with bad odour of urine.

He had a fall from tree at the age of 19, and was immediately taken to a nearby Allopathic hospital. At that time, he had complaints of low back ache and left upper limb pain. There was no history of vomiting, seizure, or nasal bleed. Emergency management was given and later shifted to a multi-speciality hospital. From there, investigations like CT, MRI of Lumbo-sacral spine, X-ray of left upper limb, USG Abdomen were done. Following pre-operative evaluations, patient underwent D12-L1-L2 pedicle screw fixation, L1-L2 laminectomy and posterior stabilization under general anaesthesia. Post-operatively he was treated with antibiotics, analgesics, antacids, antiemetics, LS belt and supportive measures. After the surgery, there was weakness and loss of sensation on bilateral lower limbs along with bowel and bladder dysfunction. He was catheterized after the surgical procedures.

### On Examination

#### Inspection

Purple discolouration in catheter bag

Tube – No discolouration and without white sediment crystals.

#### Palpation

Patient had no sense of soft touch and deep touch below the umbilicus.

### Investigations

**Table 1: Laboratory Investigations Before Treatment**

| Urine Routine Examination | 6/6/24 |
|---|---|
| Albumin | Nil |
| Bacteria | + |
| Cast and crystals | Nil |
| Epithelial cells | 8-10/ HPF |
| Pus cells | 6-8/ HPF |
| RBCs | 4-8/ HPF |
| Spermatozoa | Nil |
| Sugar | Nil |

Colour of urine- Yellow

Colour of urine bag – Purple discolouration

Computed Tomography (CT) of Lumbo-sacral spine revealed burst compression fracture of L1 vertebra involving anterior and middle column predominantly extending into bilateral lamina near paramedian aspect. Mild retropulsion of fractured fragments causing significant narrowing of spinal canal maximum A-P diameter of spinal canal at L1 level measures 10.2 mm.

Magnetic Resonance Imaging (MRI) of Lumbo-sacral spine revealed wedge compression of L1 vertebra, which involves anterior and middle column with relative sparing of posterior column. Mild retropulsion of L1 causing moderate secondary narrowing of spinal canal with mild compression and contusion of conus.

X-ray of left upper limb showed fracture of shaft of humerus. There were no significant findings in Ultrasonography (USG) of abdomen.

### Therapeutic Intervention

*Veeratharadi gana Kashaya* as *Pana (Thoya pakam)* is given for 2 weeks.

***Thoya Pakam* Preparation**: *Thoya paka* is prepared according to the classical reference from *Sarangadhara Samhitha*[3] as follows.

60gm *Kashaya choorna* boiled in 64 times water (4 litres) and reduced to half the quantity (2 litres). The product obtained was strained and given as divided doses for drinking purpose continuously for 2 weeks.

## RESULTS

Changes noted after 2 weeks of *Veeratharadi gana thoya paka* administration are as follows:

Colour of urine– Normal, pale yellow

Colour of urine bag– Normal with no purple discolouration.

**Table 2: Laboratory Investigations After Treatment**

| Urine Routine Examination | 29/7/24 |
|---|---|
| Albumin | Nil |
| Bacteria | Nil |
| Cast and crystals | Nil |
| Epithelial cells | 2-3/HPF |
| Pus cells | 1-2/ HPF |
| RBCs | Nil |
| Spermatozoa | Nil |
| Sugar | Nil |

## DISCUSSION

### On Disease

Purple Urine Bag Syndrome (PUBS) is a condition where urine collection bags turn purple in individuals with urinary catheters and concurrent urinary tract infections. Purple urine bag syndrome

was first recognized in 1978 and is more common among individuals living in nursing homes or those with long-term indwelling Foley catheters[4]. This syndrome is more commonly seen in patients with constipation. Constipation alters gut bacteria, slows gastrointestinal motility, and promotes bacterial growth in the colon. Elevated bacterial levels in urine are the main contributor to PUBS. These bacteria produce the enzyme indoxyl sulfatase, which transforms indoxyl sulfate in urine into the compounds indirubin and indigo, which are red and blue in colour[5]. In individuals with urinary tract infections using catheters, the presence of indoxyl sulfatase increases, leading to more conversion to indirubin and indigo. Indirubin, due to its lipophilic nature, can dissolve into the polymer matrix of the plastic urine bag, resulting in its characteristic discoloration.

The interaction of the pigments indirubin and indigo with the plastic material of the bag leads to the purple discoloration in urine bag. Bacteria in the urine can be identified through a bacterial culture test, which typically shows higher bacterial loads in those with Purple Urine Bag Syndrome (PUBS) compared to those without. Providencia stuartii, Providencia rettgeri, Klebsiella pneumoniae, Proteus mirabilis, Escherichia coli, Morganella morganii, and Pseudomonas aeruginosa are the most frequently implicated bacterias in this condition[6]. Treatment for PUBS focuses on addressing the underlying issues rather than the discoloration itself. The purple discoloration is not harmful and typically resolves with targeted treatment for the specific bacteria or underlying conditions. Management also includes ensuring the comfort of the patient and their family, administering antibiotics, and regularly changing the catheter to prevent further complications. The prognosis is generally favourable, but morbidity and mortality rates can be higher depending on the patient's overall health.

**On Medicine** [7]

**Table 3: Drug details of *Veeratharadi gana***

| S.No | Drug | Botanical name | Family name | Part used | *Karma* |
|---|---|---|---|---|---|
| 1 | *Veerataru* | *Dichrostachys cinerea* | Leguminosae | *Mula* | *Kapha Vata shamaka, Ashmari nashana, Mutrala, Vedanasthapana* |
| 2 | *Sahachara dvaya* | *1) Shweta Sahachara- Barleria cristata* *2) Nila Sahacahara- B. wild strigosa* | Acantheaceae | *Panchanga (Visheshat Patra)* | *Kapha Vataghna, Mutrala, Mutrakrichrahara* |
| 3 | *Darbha* | *Imparata cylindrica* | Gramineae | *Mula* | *Tridoshaghna, Ashmari nashaka, Mutrala, Dahaprashamana* |
| 4 | *Vrukshadani* | *Dendrophthoe falcata* | Loranthaceae | *Panchanga* | *Ashmarinashaka, Mutrajanana, Mutrakrichrahara, Kaphavata samaka* |
| 5 | *Gundra* | *Typha elephantina Roxb.* | Typhaceae | *Mula* | *Mutrala, Daha nashaka, Ashmari nashaka, Tridosha samaka* |
| 6 | *Nala* | *Arundo donox* | Gramineae | *Mula* | *Mutrala, Daha shamaka, Vasti shothahara, Mutrakrichrahara, Vatapitha samaka* |
| 7 | *Kusha* | *Desmostachya bipinnata* | Gramineae | *Mula* | *Asmari nashaka, Mutrala, Vastishula nashaka, Tridosha samaka* |
| 8 | *Kasha* | *Saccharum spontaneum* | Gramineae | *Mula* | *Vatapitta shamaka, Mutra virechaniya, Ashmari bhedana* |

| | | | | | |
|---|---|---|---|---|---|
| 9 | *Ashmabheda* | *Bergenia ligulata* | Saxifragaceae | *Mula* | *Tridosha shamaka, Ashmari bhedana, Mutrala* |
| 10 | *Agnimantha* | *Premna intergrifolia* | Verbenaceae | *Mula, Patra* | *Kaphavata shamaka, Shothahara, Vedanasthapana* |
| 11 | *Morata* | *Marsdenia tenacissima* | Asclepiadaceae | *Mula* | *Tridosha nashaka* |
| 12 | *Vasuka* | *Osmanthus fragrans* | Sapotaceae | *Twak, Pushpa, Phala* | *Pittakaphashamaka, Vastishothahara* |
| 13 | *Vasira* | *Achyranthus aspera* | Amaranthaceae | *Mula, Panchanga* | *Kaphavata shamaka, Mutrala, Ashmarinashana* |
| 14 | *Bhalluka* | *Oroxynum indicum* | Bignoniaceae | *Mula,Twak* | *Kaphavata shamaka, Mutrala, Vastishothahara* |
| 15 | *Kuranta* | *Barleria prionitis* | Acanthaceae | *Panchanga (Visheshtaha Patra)* | *Kaphavata shamaka, Mutrala, Mutrakruchrahara* |
| 16 | *Indivara* | *Nelumbo nucifera* | Nymphaeaceae | *Panchanga (Visheshtah Pushpa, Beeja, Mula)* | *Kaphapittashamaka, Mutrakruchrahara, Mutravirechaniya* |
| 17 | *Kapotvanga* | *Herpestris moniera* | Scrophulariaceae | *Panchanga* | *Tridoshanasaka, Mutrala* |
| 18 | *Shwadamshtra* | *Tribulus terresteris* | Zygophyllaceae | *Phala, Mula* | *Vatpittashamaka, Ashmarinashana, Mutrala* |

**Table 4: Properties of drugs in *Veeratharadi Gana***

| S.no | Drug | *Rasa* | *Guna* | *Virya* | *Vipaka* | Properties |
|---|---|---|---|---|---|---|
| 1 | *Veerataru* | *Tikta, Kashaya* | *Laghu, Ruksha* | *Ushna* | *Katu* | Useful in retention of urine, Calculi |
| 2 | *Sahachara dvaya* | *Tikta, Madhura* | *Laghu* | *Ushna* | *Katu* | Diuretic |
| 3 | *Darbha* | *Madhura, Kashaya* | *Laghu, Snigdha* | *Sheetha* | *Madhura* | Diuretic, useful in urinary disorders |
| 4 | *Vrukshadani* | *Kashaya, Tikta, Madhura* | *Laghu, Ruksha* | *Sheetha* | *Katu* | Diuretic |
| 5 | *Gundra* | *Kashaya, Madhura* | *Sheetha* | *Sheetha* | *Madhura* | Diuretic |
| 6 | *Nala* | *Madhura, Kashaya, Tikta* | *Laghu, Snigdha* | *Sheetha* | *Madhura* | Diuretic, lithotripsic, used in cystitis and dysuria |
| 7 | *Kusha* | *Madhura, Kashaya* | *Laghu, Snigdha* | *Sheetha* | *Madhura* | Diuretic, Lithotripsic |
| 8 | *Kasha* | *Madhura, Kashaya* | *Laghu, Snigdha* | *Sheetha* | *Madhura* | Diuretic, lithotripsic |
| 9 | *Ashmabheda* | *Kashaya, Tikta* | *Laghu, Snigdha, Tikshna* | *Sheetha* | *Katu* | Lithotripsic, used in dysuria |
| 10 | *Agnimantha* | *Tikta, Katu, Kashaya, Madhura* | *Ruksha, Laghu* | *Ushna* | *Katu* | Analgesic |
| 11 | *Morata* | *Tikta, Kashaya* | *Guru, Ruksha* | *Ushna* | *Katu* | Antispasmodic, |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | used for colic pain |
| 12 | *Vasuka* | *Kashaya, Katu* | *Guru* | *Sheeta* | *Katu* | Used in cystitis |
| 13 | *Vasira* | *Katu, Tikta* | *Laghu, Ruksha, Tikshna* | *Ushna* | *Katu* | Analgesic, diuretic |
| 14 | *Bhalluka* | *Kashaya, Madhura, Tikta* | *Laghu, Ruksha* | *Ushna* | *Katu* | Diuretic |
| 15 | *Kuranta* | *Tikta, Madhura* | *Laghu* | *Ushna* | *Katu* | Diuretic |
| 16 | *Indivara* | *Kashaya, Madhura, Tikta* | *Laghu, Snigdha, Picchila* | *Sheeta* | *Madhura* | Diuretic |
| 17 | *Kapotvanga* | *Kashaya, Tikta* | *Laghu* | *Sheeta* | *Madhura* | Diuretic |
| 18 | *Shwadamshtra* | *Madhura* | *Guru, Snigdha* | *Sheeta* | *Madhura* | Diuretic, lithotriptic |

**FIGURES**


**Figure 1: Before Treatment**


**Figure 2: After Treatment**

Among the 18 drugs mentioned in *Veeratharadi gana,* 11 possess *Sheeta virya* and rest 7 possess *Ushna virya.* In case of *Vipaka,* 10 drugs belong to *Katu vipaka* and 8 belongs to *Madhura vipaka*. 7 drugs are having *Kaphavata samana* while 6 drugs are *Tridosha shamaka*. 3 drugs are *Vatapitta shamaka* and only 2 are *Pittakapha shamaka*. Hence, we can conclude that, most of the drugs are *Kashaya tikta madhura rasa, Laghu guna, Seetha virya, Katu vipaka, Kaphavata samaka, Mutrala* and *Asmari nasaka* in nature. Most of these drugs are having diuretic properties.

**Probable Mode of Action**

Elevated bacterial concentrations in the urine is mostly seen in Purple Urine Bag Syndrome (PUBS). The standard urine analysis in this case demonstrated a notable reduction in both bacterial load and the presence of pus cells following treatment. This suggests that the therapeutic intervention effectively mitigates the bacterial proliferation in the urinary tract.

The administration of *Thoya kalpana* (medicated drink) likely contributes to enhanced hydration and a subsequent increase in urine production. More efficient bladder emptying may be contributed by an increased urinary flow following the intake of *Thoya paka*. This will also result in reducing the dwelling time of urine. Furthermore, the *Mutrala* (diuretic) property of *Veeratharadi gana Kashaya* facilitates the increased and unimpeded excretion of urine. This enhanced diuresis aids in the reduction of bacterial load and pus cells in the urine, consequently leading to the normalization of the urine discoloration.

The presence of *Kashaya*, *Tikta*, and *Madhura rasas* (tastes) and *Sheeta virya* (cold potency) in the constituents of *Veeratharadi gana* may contribute to alleviating symptoms such as burning sensation. Additionally, the documented *Mutrakrichrahara* (alleviating dysuria) and *Ashmari nasaka* (dissolving calculi) properties suggest a therapeutic effect on conditions affecting the bladder and kidneys.

Considering the known mechanism of PUBS, where bacterial enzymes like indoxyl sulfatase convert indoxyl sulfate into indirubin and indigo pigments that discolour the urine bag, the reduction in bacterial load facilitated by *Veeratharadi gana* is the probable key factor in the resolution of the purple discoloration. The diuretic action further supports this by flushing out the bacteria and their metabolic products.

## CONCLUSION

Purple urine bag syndrome (PUBS) is a phenomenon typically occurs in individuals who have long-term indwelling urinary catheters, often in hospital or long-term care settings. PUBS is caused by a chemical reaction between specific components in the urine and bacteria present in the urinary tract. In conventional medicine, antibiotics are the primary treatment for this condition. However, the use of *Veeratharadi gana* in its *Thoya paka* form, administered internally, has shown significant improvement in managing PUBS, thereby offering considerable enhancement in the quality of life for patients affected by this syndrome.

### Patient Perspective

The patient was satisfied with the treatment and the purple discolouration in the urine bag became normal.

### Declaration of the Patient Consent

The authors confirm that they have secured a consent form from the patient, allowing for the case to be reported in the journal. The patient is aware that his name and initials will not be disclosed, and steps will be taken to protect his identity, though complete anonymity cannot be assured.

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