

## HAEMATURIA – A RED ALERT FOR ATHLETE

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### ABSTRACT

Acharyas described *Mutravahasrotodushti* (urinary disorders) in terms of *Mutraghata* and *Mutrakruccha*. *Mutraghata* is a group of Obstructive uropathic disorders. *Ushnavata* is one among them. *Vyayama*, *Adhwa*, *Tikshnoshna bhojana*, *Atapasevana* are the important triggering factors for *Ushnavata*. Burning sensation in the bladder, pain in the rectum, urine becomes yellow, mixed with blood or only blood and comes out with difficulty are the characteristic features of *Ushnavata*. The etiology and clinical features simulate with the condition 'Exercise induced haematuria', is a variety of haematuria possibly seen in Athletes extended induced trauma to the bladder. Diagnostic approach to the condition helps to rule out malignancy in the renal system. An additional focus should be placed by the athletes, coaches and sports medicine professionals for this condition because long duration work outs and competitions may promote the symptoms. Here the general reasons for exercise induced haematuria and their diagnostic criteria are briefly reviewed.

**Keywords:** *Mutraghata*, *Ushnavata*, Exercise induced haematuria

### INTRODUCTION

Acharyas described *Mutravahasrotodushti* (urinary disorders) in terms of *Mutraghata* and *Mutrakruccha*. *Mutraghata* is a group of Obstructive uropathic disorders, as explained in *Susruta samhita*. It can be considered as a syndrome, because it covers most of the pathological entity of the urinary system into twelve types<sup>1</sup>. *Ushnavata* is one among them, which is caused due to excessive physical exercise, walking long distance and exposure to sun, leads to aggravation of *Pitta* and *Vata dosha* inside the urinary bladder and manifest burning sensation in the bladder, pain in the rectum, urine becomes yellow, mixed with blood or only

blood and comes out with difficulty are the characteristic features of *Ushnavata*<sup>2</sup>.

The etiology and clinical features simulate with the condition 'Exercise induced haematuria', is a type of microscopic haematuria which is common in athletes after the sports activity with the prevalence of 18% in athletes, 38% in military personnel and 13% even in adult people of age more than 35 years<sup>3</sup>. This has also been called as Jogger's haematuria, Runner's bladder, Marathoner's haematuria and Stress haematuria<sup>4</sup>.

**Ushnavata**

Due to the *Nidana* like *Vyayama*, *Tikshnoshnabhojana*, *Adhwa*, *Atapa* etc. causes the aggravation of *Pitta* and *Vata Doshha*.

The aggravated *Vata dosha* are lodged in the urinary pathway. The *Ushnaguna* of the *Pitta* increases and the *Soumya dhatu kshaya* will happens. It shows the *Lakshanas* like *Daha*, *Shula*, *Raktamutrata* etc. In this condition the individual passes urine with difficulty and frequently associated with pain<sup>5</sup>.

**Exercise Induced Haematuria**

Presence of RBC in the urine, it is of two types, gross and microscopic haematuria, where we can see the blood cells by naked eyes in macroscopic and whereas in microscopic haematuria presence of more than 3 RBC/ml detected on a high powered microscopic field

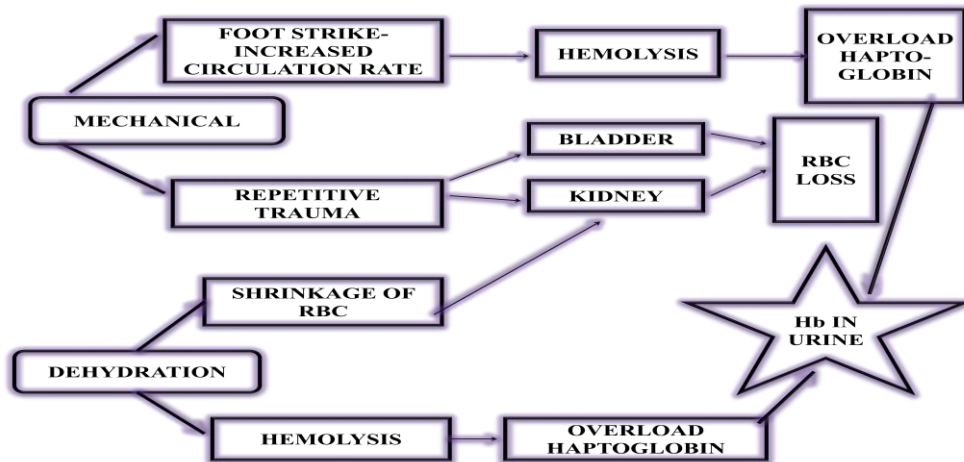
or >50 RBC/ ml of urine present on a urine dipstick. Exercise induced haematuria in athletes, it is a frequent laboratory sign results from vigorous exercise after a period of rest, either in individual sports, as running, swimming and clash sports, football etc. However, haematuria can be a signal of more serious diseases<sup>6</sup>.

**Etiology and Pathogenesis**

The general causes are of Traumatic and non-traumatic types. Traumatic causes include *Ativiyayama*, *Athyadva*. These leads to repeated impact of the bladder wall against the base.

Non traumatic causes include *Atapasevana*, *Tikshnoshnabhojana*, Dehydration, Increased body temperature, Free radicals, Catacholamines and Anabolic steroids.

**Figure 1:** Duration related mechanisms of exercise induced haematuria



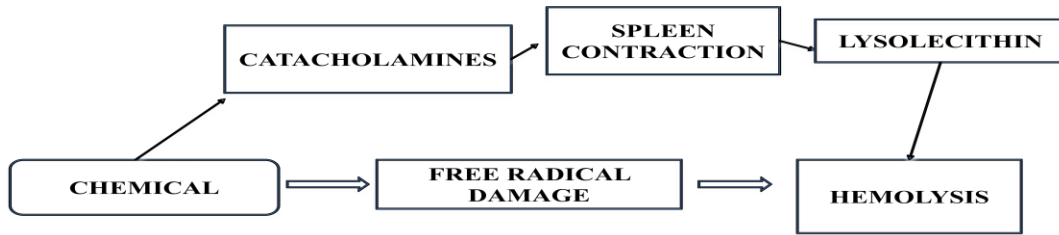
**Foot strike:** During foot strike there is a chance of getting trauma to the RBC circulates through the sole of the foot causes hemolysis. If it is more leads to overload of haptoglobin<sup>7</sup>.

**Bladder and kidney trauma:** Due to long distance running etc. the repetitive action may provoke kidneys to decent and cause the renal vein to kink at the junction

of the inferior vena cava this increases renal vein pressure<sup>8</sup>.

**Dehydration:** Due to strenuous exercise etc. excess water loss increase blood viscosity and intra erythrocytic osmolarity, blood plasma osmolarity and acute post exercise acidosis may accelerate hemolysis of older erythrocytes<sup>9</sup>.

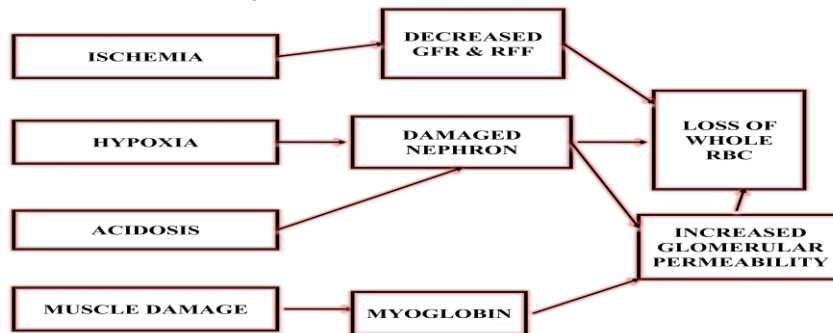
Figure 2



**Free radicals:** Exhaustive maximal exercise induces production of free radicals in large quantities, organ tissue damage, including the kidney, due to peroxidation of unsaturated fatty acids.

**Catacholamines and hemolysing factors:** Intense physical activity which stimulates adrenalin which induces splenic contraction and releases lysolecithin leads to hemolysis.

Figure 3: Intensity related mechanisms of haematuria



During intense exercise, blood is shunted to the working muscles and away from the splanchnic nerve and renal vessels to activate the muscles leads to hypoxia and ischemia.

Muscular tissue damage leads to muscle break down and release of myoglobin, creatinine and phosphokinase into the blood stream. Myoglobin may have a toxic effect on the kidney. Strenuous exercise may also cause hypoxic damage to the kidneys by elevating the concentration of lactic acid, promoting dehydration, and/or increasing the toxic release of myoglobin into the blood stream<sup>10</sup>.

**Signs and Symptoms:** Most of the time it is unnoticed, so it is Asymptomatic, and only discovered accidentally on routine investigations by urine dipstick and urine analysis. 7.2% of Athletes shows mild to moderate flank colicky pain which relieved soon by analgesics. Frequent undetected & untreated cases may show Chronic blood loss symptoms like, Fatigue,

Weakness, Palpitation, Dizziness, Tinnitus etc. Due to trauma shows the symptoms like, Redness, Hotness, Swelling, Bruises, Laceration Bleeding/ peeling in loin region. In general, haematuria may associated with other symptoms related to the underlying cause, but it is quite far from exercise induced haematuria as it has no symptoms like, abdominal pain, back pain, painful micturition, urgency, frequency, fullness, headache, fever, chills and anuria<sup>11</sup>.

**Risk Factors**

- Positive family history
- Medication like Aspirin and Penicillin
- Stress and Vigorous exercise
- Smoking history
- More exposure to benzene, dyes
- Underlying UT diseases
- Running, horse riding, mountain biking, cycling, swimming, boxing, football etc<sup>12</sup>.

**Differential Diagnosis:** Microscopic haematuria is the symptom of differential diagnosis that can be easily misinterpreted; the following differential diagnosis can be suggested like, systemic diseases or source outside genitourinary system like, Endocarditis, SLE, Vasculitis, Coagulation defects, Hypertension, Tuberculosis etc.

Diseases related to genitourinary system are, Congenital, Traumatic, Inflammatory, Neoplastic, Vascular, Calculus, Auto immune Neurological diseases<sup>13</sup>.

**Diagnostics:** If Haematuria doesn't resolve within 48-72 hours, should consider further evaluation.

Diagnosis and intervention should be adapted to the individual based on history of past illness, age, medical history, diet, drug history etc.

### History

- Recent vigorous exercise
- No flank or pelvic pain
- No dysuria
- No penile/ Vaginal discharge
- No hesitancy, nocturia, urgency or frequency of urination
- No history of trauma
- No history of kidney/bladder/urethral injuries
- No family history of kidney disease
- No symptoms of prostate disease
- Obtain menstrual history

### Physical Examination

- Genitourinary exam is often normal
- Consider pelvic exam in females to rule out for vaginal sources of bleeding
- Look for signs of trauma
- Ecchymosis over flank suggest renal trauma
- Ecchymosis over bladder or genital suggests bladder/urethral trauma

### Diagnostic Testing

Consider CBC for evaluation of anemia if,

- Gross hematuria
- Microscopic hematuria does not resolve
- Hematuria is frequent
- Consider imaging if hematuria fails to resolve within 7 days
- Urine culture if suspect UTI

- CBC, BUN/ creatinine
- Renal ultrasound or CT if suspect trauma or renal disease
- IVP; low cost, yet limited sensitivity for detecting small renal masses
- Also, requires exposure to contrast which is potentially nephrotoxic
- Cystoscopy: consider if those age 40 or more, those with risk factors for bladder cancer, or with abnormal urine cystology.
- If > age 40, consider urology referral for further testing
- Excretory urogram and cystograph.<sup>14</sup>

### In laboratory

- Urinalysis & 3 glass test: for protein, RBCs, RBC casts, Bacteria
- UA repeat in 24-72 hours w/o exercise
- False positives in Microglobulinuria, Semen
- Phase contrast microscopy: for RBCs morphology
- Cytology: for exfoliated malignant cells
- Creatinine – For significant renal disease

### Radiology

#### Imaging studies

Ultrasound: primary investigation; IVU: standard investigation; CT urography; MRI; Retrograde pyelography; Renal biopsy: in nephrological cases; Cystoscopy<sup>15</sup>

## DISCUSSION

Microscopic haematuria in athletes is appearance of occult blood in urine of athlete after vigorous exercise by a period not more than 3 days. If dipstick test is positive for blood, the amount is determined by microscopic examination and result is confirmed if three or more red blood corpuscles are seen per high power field microscope on two or three specimens.

It is often detected accidentally, or it will remain undetected usually it is come after a period of rest and lasts for 48-72 hours as it is self limited<sup>16</sup>. Otherwise urinary tract disease should be excluded. Microscopic haematuria is either traumatic or non-traumatic. Vasoconstriction of the splanchnic and renal vessels during exercise leads to redistribution of blood to skeletal

muscles, which causes hypoxic damage to nephron and increase in glomerular permeability with increase in excretion of red blood cells and protein into urine, constriction of efferent glomerular arteriole increase filtration pressure and thus more release of RBCs depending on capacity of exercise<sup>17</sup>. In clinical practice microscopic and macroscopic haematuria are regarded as evidence of underlying urinary tract disease until proved otherwise. The standard advice is that no matter how trivial the bleeding, a complete investigation is mandatory. Investigation may include a formidable array of invasive procedures such as intravenous and perhaps retrograde pyelography, cystoscopy, renal biopsy, and renal arteriography<sup>18</sup>.

## CONCLUSION

*Vyayama, Adhwa, Atapasevana, Tikshnoshnabhojana*, are the important triggering factors for *Ushnavata*. Jogger's haematuria is a variety of haematuria possibly seen in Athletes extended induced trauma to the bladder. *Saraktamutrata* and *Krucchamutrata* are the important features which are seen in *Ushnavata* also seen in jogger's haematuria. So, considering the etiology and presenting features *Ushnavata* can be understood as jogger's haematuria. In general, EIH is preventable, and sports men should be aware of it to avoid development of anemia, UT I problems and other possible pathologies. Health care staff should not underestimate the condition without investigation. Because another underlying cause may be found accidentally underneath moreover, early screening and protection of high-risk trainees are necessary. Not many studies on exercise induced haematuria have been published. However, this problem is not rare.

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