



Differentials of abnormal urine color: a review

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Keywords: *Urine, Discoloration of urine, Urinalysis*

Abstract

Change in the color of urine may be distressing to the patients, their family members and physicians as well. Many of the causes of abnormal discoloration of urine are benign; however, changes in the color of urine can be a sign of an underlying serious illness. In many cases the diagnosis may be made with thorough history and urine analysis. In this article we are listing the potential causes of urine discoloration which help physicians to form treatment plan.

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Date of Submission: Oct 3, 2014

Date of Acceptance: Oct 20, 2014

Date of Publishing: Oct 21, 2014

How to cite this paper:

Singh AK, Agrawal P, Singh AK, Singh O. Differentials of abnormal urine color: a review. *Annals of Applied Bio-sciences*. 2014;1:R21-25

Introduction

Any deviation in normal urine color may be distressing to patient as well as clinician. Patient expects an explanation for change in the color of their urine. Much of the information of discoloration of urine comes from case reports as there is little original research regarding urine discoloration. Moreover there is no standardized way to describe urine color. For example a clinician can use the term dark to muddy brown, orange or even crimson red. This review attempts to help physicians to form a narrow differential diagnosis and treatment plan. Following discussion enumerates major causes of different urine color which are described in detail in the review.

Discussion

Differential diagnosis of abnormal urine color:

Red urine

- Medications: Rifampicin, Warfarin, Phenazopyridine, Ibuprofen, Deferoxamine, Hydroxocobalamine.
- Foods: beets, carrots, blackberries.
- Intravascular hemolysis: G6PD deficiency, Sickle cell anaemia, Thalassemia, Transfusion reaction.
- Other medical conditions: Porphyria, Nutcracker syndrome, Nephrolithiasis, BPH, Urinary bladder malignancy, Prostate malignancy.
- Other conditions: contamination (menstruation), factitious disorder.

Orange urine

- Medications (in addition to causes of red urine): Isoniazid, Riboflavin.

Brown urine

- Acetaminophen overdose, Metastatic melanoma.

Black urine

- Medications: Metronidazole, Nitrofurantoin, Sorbitol, Cresol, Intramuscular iron.

- Medical conditions: Alkaptonuria, Metastatic melanoma.

White urine:

- Mineral sediments: hyperoxaluria, hypercalciuria, phosphaturia.
- Medical conditions: Chyluria (filariasis, lymphatic fistula), Pyuria, Urinary tuberculosis, Proteinuria.

Blue and green urine:

- Medications: Methylene blue, Promethazine, Cimetidine, Propofol, Metoclopramide, Amitriptyline, Indomethacin, Tetrahydronaphthalene.
- Other conditions: Herbicide ingestion, pseudomonas UTI, bile pigments in urine, Hartnup disease, Blue diaper syndrome.

RED URINE

The term red includes the colors like pink; shades of red, brown orange or even black depending upon who views the sample.^[1] In these cases, the physician must advise a urine dipstick and urine analysis to see presence of hemoglobin or red blood cells. If blood is really present then differential includes disorders of renal collecting systems^[2], hematological systems^[3,4] and contamination from menstrual blood. Further work up will be guided by clinical profile of the patients.

Glucose-6-phosphate dehydrogenase deficiency, Sickle cell anemia, Thalassemia and Transfusion reaction can lead to hemolysis and deep reddish urine^[5,6]. Nutcracker syndrome (entrapment of the left renal vein between the superior mesenteric artery and aorta) an anatomical condition may be elucidated by CT scan is an uncommon disease.

Porphyria can lead to dark red urine due to presence of porphyrin in the urine even without the presence of blood in urine.^[7]

Medications leading to red urine include Rifampicin^[8], Warfarin^[9], Phenazopyridine^[10], Ibuprofen and Deferoxamine^[11]. Hydroxocobalamine used in the treatment of cyanide poisoning produces the red discoloration of urine as well as skin^[12].

Some food like carrots (carotene)^[13], blackberries and beets can produce red urine occasionally.

Last but not the least, in some factitious disorders, a patient may present with red color urine by adding blood or some other red-colored material into urine sample.^[14,15,16]

ORANGE URINE

Orange discoloration of urine may be caused by any of the above mentioned conditions. Ingestion of substances such as Riboflavin^[17] and Isoniazid^[18] may also result in orange urine.

BROWN URINE

Acetaminophen overdose can lead to brown urine due to accumulation of P-aminophenol metabolite.^[19] Metastatic melanoma can cause dark skin and brown or black urine.^[20]

BLACK URINE

Medications leading to black urine include Metronidazole^[21], Nitrofurantoin, Sorbitol and Phenol derivative Cresol.^[22] Intramuscular injection of iron is also associated with black color urine.

A rare genetic disorder Alkaptonuria can lead to black urine due to accumulation of Homogenetic acid in the body.

WHITE URINE (ALBINURIA)

It has wide range of differentials and requires thorough work up beyond a simple urinalysis. Mineral sediments in urine like hypercalciuria, hyperoxaluria and phosphaturia, can be found out after centrifugation and analysis^[23]. Severe urinary tract infection may cause white urine (pyuria)^[24]. Caseous material from urinary tract tuberculosis should also be kept in mind.

Chyluria is another differential of albinuria. It occurs when there is abnormal communication between urinary tract and lymphatics. Most commonly it occurs due to filariasis^[24] but can also be the result of lymphatic fistula.^[25]

BLUE AND GREEN URINE

Blue urine is typically caused by Methylene blue ingestion^[26,27]. This is used to treat Methemoglobinemia^[28,29]. True blue colored urine is quite rare because blue pigment combine with urochrome to produce a green color before elimination of urine.

This is the reason for several case reports in which methylene blue turns urine green^[30,31,32].

Other medications which may cause green urine include Promethazine^[32], Cimetidine^[33], Propofol^[34-37], Metaclopramide^[38], Amitriptyline^[39] and Indomethacin. One interested thing is that Propofol is also associated with pink^[40] and white urine^[41].

In Literature, there are the case reports of a pesticide Tetrahydronaphthalene^[42] (which was used in 1980s as an over the counter treatment of lice) and ingestion of the herbicides Mefenaceta and Imazosulfuro^[43] producing green colored urine.

Pseudomonas bacterium causing UTI can present with green urine^[39,44]. Rarely bile pigments in the urine may cause green colored urine. A case has been reported on enterovesical fistula as a complication of pelvic radiation therapy may produce green urine.^[45]

An autosomal recessive disorder, 'Hartnup disease'^[41] may cause blue colored urine. Blue diaper syndrome^[46], a familial condition is characterized by hypercalcemia, nephrocalcinosis and indicanuria (blue urine).^[46]

Conclusion

Keeping all the conditions in mind is difficult, however having a list of different urine color on the clinician's desk will be of help and can prove to be a great resource and help him to narrow the differential diagnosis. It will also help to decide for, which test is to be ordered and to ask the related history of drug or respective food intake or any other condition suggesting the urine color.

Acknowledgements

None.

Funding

None.

Competing Interests

None declared.

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