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DEPARTMENT: NURSING

Characteristics and composition of Urine

CHARACTERISTICS

Quantity

Average urine production in adult humans is around 1.4 L of urine per person per day with a normal range of 0.6 to 2.6 L per person per day, produced in around 6 to 8 urinations per day depending on state of hydration, activity level, environmental factors, weight, and the individual's health. Producing too much or too little urine needs medical attention. Polyuria is a condition of excessive production of urine (> 2.5 L/day), oliguria when < 400 mL are produced, and anuria being < 100 mL per day.

Colour

Urine varies in appearance, depending principally upon a body's level of hydration, as well as other factors. Normal urine is a transparent solution ranging from colourless to amber but is usually a pale yellow. In the urine of a healthy individual, the colour comes primarily from the presence of urobilin. Urobilin is a final waste product resulting from the breakdown of heme from haemoglobin during the destruction of aging blood cells.

Colourless urine indicates over-hydration, generally preferable to dehydration (though it can remove essential salts from the body). Colourless urine in drug tests can suggest an attempt to avoid detection of illicit drugs in the bloodstream through over-hydration.

- Dark yellow urine is often indicative of dehydration.

- Yellowing/light orange may be caused by removal of excess B vitamins from the bloodstream.
- Certain medications such as rifampin and phenazopyridine can cause orange urine.
- Bloody urine is termed haematuria, a symptom of a wide variety of medical conditions.
- Dark orange to brown urine can be a symptom of jaundice, rhabdomyolysis, or Gilbert's syndrome.
- Black or dark-coloured urine is referred to as melanuria and may be caused by a melanoma or non-melanin acute intermittent porphyria.
- Pinkish urine can result from the consumption of beets.
- Greenish urine can result from the consumption of asparagus or foods or beverages with green dyes.
- Reddish or brown urine may be caused by porphyria (not to be confused with the harmless, temporary pink or reddish tint caused by beeturia).
- Blue urine can be caused by the ingestion of methylene blue (e.g., in medications) or foods or beverages with blue dyes.
- Blue urine stains can be caused by blue diaper syndrome.
- Purple urine may be due to purple urine bag syndrome.

Odour

Sometime after leaving the body, urine may acquire a strong "fish-like" odour because of contamination with bacteria that break down urea into ammonia. This odour is not present in fresh urine of healthy individuals; its presence may be a sign of a urinary tract infection.

The odour of normal human urine can reflect what has been consumed or specific diseases. For example, an individual with diabetes mellitus may present a sweetened urine odour. This can be due to kidney diseases as well, such as kidney stones.

Eating asparagus can cause a strong odour reminiscent of the vegetable caused by the body's breakdown of asparagusic acid. Likewise consumption of saffron, alcohol, coffee, tuna fish, and onion can result in telltale scents. Particularly spicy foods can have a similar effect, as their compounds pass through the kidneys without being fully broken down before exiting the body.

Turbidity

Turbid (cloudy) urine may be a symptom of a bacterial infection, but can also be caused by crystallization of salts such as calcium phosphate.

pH

The pH normally is within the range of 5.5 to 7 with an average of 6.2. In persons with hyperuricosuria, acidic urine can contribute to the formation of stones of uric acid in the kidneys, ureters, or bladder. Urine pH can be monitored by a physician[8] or at home.

A diet which is high in protein from meat and dairy, as well as alcohol consumption can reduce urine pH, whilst potassium and organic acids, such as from diets high in fruit and vegetables, can increase the pH and make it more alkaline. Some drugs also can increase urine pH, including acetazolamide, potassium citrate, and sodium bicarbonate.^[*citation needed*]

Cranberries, popularly thought to decrease the pH of urine, have actually been shown not to acidify urine. Drugs that can decrease urine pH include ammonium chloride, chlorothiazide diuretics, and methenamine mandelate.

Density

Human urine has a specific gravity of 1.003–1.035. Any deviations may be associated with urinary disorders.

Hazards

Healthy urine is not toxic. However, it contains compounds eliminated by the body as undesirable, and can be irritating to skin and eyes. With suitable processing, it is possible to extract potable water from urine.

Bacteria and pathogens

Urine is not sterile, not even in the bladder. Earlier studies, with less sophisticated analytical techniques, had found that urine was sterile until it reached the urethra. In the urethra, epithelial cells lining the urethra are colonized by facultatively anaerobic Gram-negative rod and cocci bacteria

COMPOSITION

Urine Is 95% Water

The nephrons of the kidneys process blood and create urine through a process of filtration, reabsorption, and secretion. Urine is about 95% water and 5% waste products. Nitrogenous wastes excreted in urine include urea, creatinine, ammonia, and uric acid. Ions such as sodium, potassium, hydrogen, and calcium are also excreted.

Constituents

About 91-96% of urine consists of water. Urine also contains an assortment of inorganic salts and organic compounds, including proteins, hormones, and a wide range of metabolites, varying by what is introduced into the body.

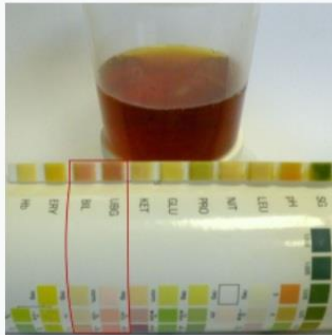
The total solids in urine are on average 59 g per person per day. Organic matter makes up between 65% and 85% of urine dry solids, with volatile solids comprising 75–85% of total solids. Urea is the largest constituent of the solids, constituting more than 50% of the total. On an elemental level, human urine contains 6.87 g/L carbon, 8.12 g/L nitrogen, 8.25 g/L oxygen, and 1.51 g/L hydrogen. The exact proportions vary with individuals and with factors such as diet and health. In healthy persons, urine contains very little protein and an excess is suggestive of illness.



Dark urine due to low fluid intake.



Dark red urine due to **blood (hematuria)**.



Dark red urine due to **choloria**.



Pinkish urine due to consumption of [beetroots](#).



Green urine during long term infusion of the sedative [propofol](#).

CREATININE, AMMONIA
AND URIC ACID: 0.2%

DISSOLVED SALTS AND
OTHER IONS: 2.8%

UREA: 2%



URINE COMPOSITION