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**Human Anatomy and Physiology 2**

**NURS 142**

**Effect of overhydration and dehydration on**

**Physical and chemical examination of urine.**

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**Objective**

1-Discuss the appearance and physical properties of urine and identify factors that may alter urine characteristics.

2-Discuss those tests routinely performed in the urinalysis to identify abnormal constituents.

3-Discuss several normal urine constituents and their origin, no crystalline constituents normally found in urinary sediment.

**Introduction**

The kidneys play an important role in homeostasis and maintaining constant conditions within the body. They regulate the chemical content, pH and osmotic pressure. The kidneys form urine through the processes they perform such as filtration, reabsorption, and so on. This laboratory will show the change in the composition of urine and the speed at which kidney function can change through two experiments, the first is drinking 3 to 4 liters of water over a period of 24 hours and then calculating the amount of urine that was excreted and conducting experiments on it, and the second is fasting for up to 8 hours Calculating the amount of urine that was excreted during this time, then conducting experiments on it, and then comparing the results we obtained.

**Results:**

**Table (1):-**

**Over hydration**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Gender** | **Collection time (hour)** | **Urine volume (Liter)** | **Color** | **Specific gravity** | **PH** | **Water intake (Liter)** |
| **A** | M | 4 | 2.6L | Light | 1.005 | 6 | 3.5 |
| **B** | F | 10 | 3.5L | Light yellow | 1.03 | 6 | 3 |
| **C** | F | 10 | 2.5L | Very light | 1.025 | 6 | 2.5 |
| **D** | F | 8 | 4.5L | Very light yellow | 1.005 | 6.5 | 5 |
| **Results** | **-** | 8+/-1.4(4) | 3.275+/-0.466 | - | 1.016+/-0.0065 | 6.125+/-0.126 |  |

**Table (2):-**

**Dehydration**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Gender** | **Collection time (Hour)** | **Urine volume (Liter)** | **Color** | **Specific gravity** | **PH** | **Water intake** |
| **A** | F | 9 | 0.1L | Dark | 1.02 | 6.5 | 0 |
| **B** | F | 14 | 0.4L | Dark | 1.03 | 6 | 0 |
| **C** | F | 8 | 0.1L | Dark | 1.025 | 6.5 | 0 |
| **D** | M | 8 | 0.25 | Very yellow | 1.03 | 6 | 0 |
| **Results** | - | 9.75+/-1.4(4) | 0.213+/-0.072 | - | 1.026+/-0.0025(4) | 6.25+/-144(4) | - |

**Table3:-**

**Physical Examination**

|  |  |  |
| --- | --- | --- |
|  | **Over hydration** | **Dehydration** |
| **Color** | **Very light (Diluted)** | **Dark (Concentrated)** |
| **Appearance** | **Clear** | **Clear** |
| **Urine Sediments (microscope).** | **A white circle with a black background  Description automatically generated with low confidence** | **No picture taken.** |
| **Bilirubin** | **A:** 1(17). **B:** -  **C:** - **D:** 1(17) | **A:** - **B:** positive  **C:** 1 **D:** - |
| **Urobin** | **A:** 1. **B:** 0.1  **C:** 0.1. **D:** 12 | **A:** 1 **B:** 0.1  **C:** 0.1 **D:** 12 |
| **Blood** | **A:** - **B:** -  **C:** - **D:** - | **A:** - **B:** -  **C:** - **D:** - |
| **Glucose** | **A:** - **B:** -  **C:** - **D:** - | **A:** - **B:** -  **C:** - **D:** - |
| **Protein** | **A:** - **B:** -  **C:** - **D:** - | **A:** - **B:** track  **C:** - **D:** - |
| **Nitrite** | **A:** - **B:** -  **C:** - **D:** - | **A:** - **B:** -  **C:** - **D:** - |
| **Ketone** | **A:** 5(0.5) **B:** -  **C:** - **D:** 160(16) | **A:** - **B:** 5  **C:** 5 **D:** 160(16) |

**Discussion:**

For this experiment, two members of each group went under overhydration and dehydration and collect the urine over a period of time un urine collection containers, and we started to examine the urine samples for the following:

**Color**

Dehydration urine sample color was dark yellow because it is concentrated. However, overhydration urine sample was light amber yellow because it is diluted.

**Specific Gravity**

we measured the specific gravity for our samples and the overhydration sample`s specific gravity is: 1.004, while the dehydration sample`s specific gravity is: 1.025

as shown in the results, the more diluted the urine is, the lower is the specific gravity.

and the more concentrated the urine is, the higher is the specific gravity because the density of the materials, minerals, dissolved compounds present in urine increased.

**pH**

To measure the pH of our urine samples, we dip a strip of pH test paper into the sample and then place the strip on a tissue paper and wait for 60 seconds. After that we compared the color of the test strip with a standard color chart and recorded the pH data for both dehydration and overhydration samples.

As shown in the table, the pH is not significantly affected by overhydration or dehydration but when drinking plenty amounts of water as the case of overhydration the pH can become slightly less acidic, and dehydration can make pH more acidic.

**Microscopic examination of urinary sediment**

First, we pour 10 ml of each urine sample into marked tubes and place them in the centrifuge machine and we centrifuge them for 10 minutes at 1,500 to 2,000 rpm, after that a sediment has formed in each urine tube so we pour off all urine from the tubes and leave the sediment inside tubes and then we mix the sediment of each tube to make more diluted and then we placed a drop of the sediment on a microscopic slide, we covered the drop with a coverslip and examine it under the microscope to observe structures visible.

Sediment of dehydration sample under the microscope showed: sodium urate crystals and calcium crystals. It is normal to have few small urine crystals but a larger in size crystals or crystals of specific type can become kidney stones overtime.

As seen in image A, Sediment of overhydration sample under the microscope showed: small amounts of mucus threads. Which is normal to be present in urine but if there was large amount of mucus threads, it may indicate that person has urinary tract infection (UTI).

**Conclusion:**

As conclusion, urinalysis is a test of our urine. It's used to detect and manage a wide range of disorders, such as urinary tract infections, kidney disease and diabetes. A urinalysis involves checking the appearance, concentration and content of urine. For example, a urinary tract infection can make urine look cloudy instead of clear. Increased levels of protein in urine can be a sign of kidney disease.