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Urinalysis As a Rapid Assessment Method of Organ Status in HIV Patients Placed on Therapy

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Abstract: Forty HIV-positive patients under therapy and forty HIV-negative subjects were studied prospectively with clinical evaluations of the urinary urobilinogen, bilirubin, protein, ketones, ascorbic acid, glucose and pH. Dipstick method was used for the analysis. 46.2% of the HIV-positive patients under therapy and 10.0% of HIV-negative subjects had their urinary bilirubin elevated respectively. 23.1% of HIV-positive patients had their urinary ketones elevated while all the HIV-negative subjects were normal. 46.2% of HIV-positive patients and 30.0% of HIV-negative subjects had their urine ascorbic acid levels elevated. 72.9% of the HIV-positive patients had urine protein elevation while none of the HIV-negative patients experienced elevation of urine protein, 61.5% of HIV-positive patients and 40.0% of the HIV-negative subjects had elevation of the pH of urine. There were no changes in urobilinogen and glucose levels. The fluctuations in the bilirubin, ketones, protein, ascorbic acid and pH levels could be used as rapid assessment methods in HIV infected subjects.

Key words: Urinalysis · Organ Status · HIV

INTRODUCTION

Human immunodeficiency virus (HIV) causes progressive impairment of the body's cellular immune system. This cellular immune system impairment increases the susceptibility of the host to tumours, infections and Acquired immunodeficiency syndrome (AIDS). HIV is an enveloped RNA virus belonging to the subgroup of retroviruses [1].

The immune system is the body's defense against disease and illness. It is a complex network of the organs, cells and proteins that defends the body against invasion by foreign disease-bearing organisms, such as the HIV, identifies and destroys abnormal cells, such as cancer cells and flushes dead and damaged cells out of the body [2]. The above mentioned cellular immune functions are seriously altered in HIV infection.

Liver and kidney diseases are common in the HIV infected individuals because the virus transverses the organs of the body. In fact, the liver and the kidney are been found to be the reservoir of HIV in HIV-infected individuals [3,4]. The invasion of these principal organs of the host affects their function, hence the levels of their secretions are drastically been altered.

Urinalysis can be employed as a tool to assess the status of these organs in HIV infection. It provides information not only about the kidneys, but also the liver and other organs [5]. This work employed urinalysis in the assessment of organ status in HIV patients placed on therapy.

MATERIALS AND METHODS

Materials: The test urine samples were collected from the in and out HIV-positive patients of Ebonyi State Teaching Hospital, Abakaliki while the control samples were collected from HIV-negative subjects in Umuoghara village of Ezzamgbo, Ohaukwu L.G.A., Ebonyi State. A visual colour chart and one combi 9 screen container containing hundred urine strips were used.

Method: The subjects were given one clean transparent universal specimen container each and were asked to void their early morning urine into the containers. Dipstick stick (medi-test combi 9 screen strip) method was used to conduct the test on the urine samples.

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RESULTS

Some urine parameters such as urobilinogen, bilirubin, total protein, ketones, ascorbic acid, glucose and pH tested in HIV-positive subjects are as shown in table 1.

Reference Range

- Normal urinary urobilinogen level = less than 2.0mg/dl
- Normal urinary bilirubin level = less than 0.50mg/dl
- Normal urinary total protein level = less then 30.0mg/dl
- Normal urinary ketone level = less than 25.0mg/dl
- Normal urinary ascorbic acid level = less than 10.0mg/dl
- Normal urinary glucose level = less than 50.0mg/dl
- Normal urinary pH level = 5-6

DISCUSSION AND CONLUSION

All the samples from both HIV positive and HIV negative subjects had normal levels of urobilinogen and glucose (Tables 1 and 2). This is an indication that HIV/ AIDS infection does not affect the levels of urobilinogen in humans [6]. This is in accordance with the finding of Notions [7]. This could be because the virus does not cause carbohydrate storage disease.

Table 1: Urine composition of HIV positive subjects placed on therapy

S/N	Urobilinogen(mg/dl)	Bilirubin (mg/dl)	Total protein (mg/dl)	Ketones (mg/dl)	Ascorbic acid (mg/dl)	Glucose (mg/dl)	pH
1	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	7
2	<2.0	<0.50	30.0	100	<10.0	<50.0	8
3	<2.0	<0.50	30.0	25.0	<10.0	<50.0	7
4	<2.0	<0.50	<30.0	25.0	<10.0	<50.0	7
5	<2.0	<0.50	30.0	<25.0	20.0	<50.0	7
6	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
7	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	6
8	<2.0	1.0	30.0	<25.0	10.0	<50.0	5
9	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	7
10	<2.0	2.0	30.0	<25.0	10.0	<50.0	6
11	<2.0	<0.50	<30.0	<25.0	20.0	<50.0	5
12	<2.0	1.0	30.0	<25.0	<10.0	<50.0	7
13	<2.0	2.0	100	<25.0	10.0	<50.0	6
14	<2.0	<0.50	30.0	25.0	20.0	<50.0	7
15	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
16	<2.0	1.0	30.0	<25.0	10.0	<50.0	6
17	<2.0	1.0	30.0	25.0	<10.0	<50.0	7
18	<2.0	<0.50	100	<25.0	20.0	<50.0	6
19	<2.0	2.0	30.0	25.0	<10.0	<50.0	6
20	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	7
21	<2.0	<0.50	30.0	<25.0	10.0	<50.0	7
22	<2.0	<0.50	30.0	25.0	<10.0	<50.0	7
23	<2.0	2.0	100	<25.0	<10.0	<50.0	8
24	<2.0	1.0	30.0	<25.0	10.0	<50.0	7
25	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	7
26	<2.0	1.0	<30.0	<25.0	20.0	<50.0	7
27	<2.0	2.0	100	<25.0	<10.0	<50.0	6
28	<2.0	<0.50	30.0	<25.0	10.0	<50.0	6
29	<2.0	1.0	30.0	25.0	<10.0	<50.0	7
30	<2.0	1.0	30.0	<25.0	10.0	<50.0	6
31	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	8
32	<2.0	1.0	30.0	<25.0	10.0	<50.0	6
33	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	7
34	<2.0	1.0	<30.0	<25.0	10.0	<50.0	7
35	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	7
36	<2.0	1.0	30.0	<25.0	<10.0	<50.0	6
37	<2.0	1.0	100	<25.0	10.0	<50.0	7
38	<2.0	1.0	<30.0	<25.0	<10.0	<50.0	6
39	<2.0	<0.50	30.0	<25.0	<10.0	<50.0	7
40	<2.0	1.0	30.0	<25.0	10.0	<50.0	7

From the table above (Table 1), the results showed that the urobilinogen and glucose levels remained normal in HIV-positive subjects under the study.

Table 2: Urine composition of HIV negative subjects (controls)

S/N	Urobilinogen(mg/dl)	Bilirubin (mg/dl)	Total protein (mg/dl)	Ketones (mg/dl)	Ascorbic acid (mg/dl)	Glucose (mg/dl)	pH
1	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	7
2	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
3	<2.0	1.0	<30.0	<25.0	10.0	<50.0	7
4	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	8
5	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	8
6	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
7	<2.0	1.0	<30.0	<25.0	<10.0	<50.0	6
8	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
9	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
10	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
11	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
12	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
13	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
14	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
15	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
16	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
17	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
18	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	5
19	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
20	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
21	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
22	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
23	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
24	<2.0	1.0	<30.0	<25.0	10.0	<50.0	6
25	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
26	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
27	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
28	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
29	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	5
30	<2.0	1.0	<30.0	<25.0	<10.0	<50.0	6
31	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	8
32	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
33	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
34	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
35	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
36	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7
37	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	6
38	<2.0	<0.50	<30.0	<25.0	10.0	<50.0	6
39	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	8
40	<2.0	<0.50	<30.0	<25.0	<10.0	<50.0	7

10.0% of the samples from HIV negative subjects and 47.5% of the samples from HIV positive subjects under therapy had urinary bilirubin elevation respectively. The presence of bilirubin in HIV infection could be as a result of liver diseases or jaundice caused by the virus [8].

All the samples from HIV negative subjects had normal urinary total protein levels while in the HIV positive subjects, 77.5% had abnormal urinary protein elevation. The proteinuria in HIV infection is a reflection of the increase in glomerular permeability for normally non-filtered plasma macromolecules such as albumin [9]. This increase in glomerular permeability may be as a result of the HIV infection or other diseases prevalent in HIV infection [10].

Ketones in HIV negative subjects were normal while in HIV positive subjects, about 20.0% of the samples had ketone elevation. This ketone elevation could be as a result of severe dehydration, fat metabolism, glycogen storage diseases or untreated diabetes caused by the HIV/AIDS infection or by drugs [11].

30.0% of the HIV negative subjects and 47.5% of the HIV positive subjects had ascorbic acid level elevation respectively. Free radicals are formed in HIV/AIDS infection; vitamin C is utilized by the body to destroy the radicals. In destroying free radicals, vitamin C is depleted and could be excreted into the urine [12].

42.5% of the HIV negative subjects and 62.5% of the HIV positive subjects had pH elevation respectively.

Normal urinary pH value of fresh urine of healthy subjects is slightly acidic. It varies between pH range of 5 and 6. The persistent high urine pH in HIV/AIDS infection might be as a result of renal and metabolic disorders caused by the infection or by the alkalinity of the admitted drugs.

In conclusion, it could be suggestive that the liver and kidney functions were impaired in HIV/AIDS infection. These abnormal index levels could be maintained by routine check-ups.

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