Selvam

Average values in respect of some biochemical parameters in captive wild animals in the National Zoological Park, New Delhi

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Introduction

National Zoological Park, New Delhi under the Ministry of Environment and Forests, has a full fledged veterinary hospital with all basic facilities including X-ray machine and a clinical laboratory. Basic pathological tests of clinical importance are being carried out in the laboratory in a specified schedule. The normal biochemical values of wild animals are not easily available. That is why, it is sometimes not so simple to diagnose an ailing animal in time. The old and traditional methods have become outdated due to day-to-day advancement in the field of diagnostic procedures. Therefore, it was felt that there is a necessity to find out normal values of biochemical parameters in urine of wild animals. Consequently, a total of 440 samples were analysed and the values collected during last three years. These were tabulated on results obtained from newly introduced urine analysis strips. The urine samples of zoo animals are analysed quarterly in a year as a routine practice.

Materials used

1. Urine analysis strips (Multistix)
2. Stop watch
3 Surgical tray
4. Absorbant cotton

Chemical principle of the procedure

Urine analysis strips are available in the market manufactured by Bayers diagnostics India Ltd. with a trade name of "Ames"-Multistix. The strips can show the result of eight different parameters, e.g., Glucose, bilirubin, ketones, specific gravity, blood, pH, protein and Urobilinogen in one minute duration. The time required by different parameters to complete the test result is shown in Table 1.

Table 1: Time factor required during the reaction of each parameter of urine:

No.	Parameters	Time taken
1.	Glucose	30 seconds
2.	Bilirubin	30 seconds
3.	Ketone	40 seconds
4.	Specific gravity	45 seconds
5.	PH	60 seconds
6.	Blood	60 seconds
7.	Protein	60 seconds
8.	Urobilinogen	60 seconds

The old and traditional methods need a large quantity of sample and takes a lot of time, whereas the "Ames"-Multistix needs only a little amount of urine sample and can give results of eight different parameters in just one minute Moreover, it is not even necessary to bring the sample to the laboratory. It is important because it is not so easy to collect the urine sample of wild animals.

Glucose: The test is based on a double sequential enzyme reaction - one enzyme glucose oxidase catalyzes the formation of glutamic acid and hydrogen peroxide from the oxidation of glucose. A second enzyme peroxide catalyzes the reaction of hydrogen peroxide with potassium iodide chromogen oxidizes the chromogen to colour ranging from green to brown.

Bilirubin: The test is based on the coupling of bilirubin with diazotized dichloroaniline in a strongly acid medium. The colour ranges from various shades of tan.

Ketones: The test is based on the development of colour ranging from buff- pink for a negative reading to purple when acetoacetic acid reacts with nitroprusside.

Specific gravity: This test is based on the apparent pKa change of certain pretreated polyelectrolytes in relation to ionic concentration. In the presence of an indicator colour ranges from deep blue-green. In urine of low ionic concentration through green and yellow green in urines of increasing ionic concentration.

pH: This test is based on a double indicator principle that gives a range of colours covering the entire urinary pH range. Colour from orange through yellow and green to blue.

Protein: This test is based on the protein-error of indicator principle. At a constant pH the development of any green colour is due to the presence of protein. Colours range from yellow for negative and green to green blue for positive reaction.

Urobilinogen: This test is based on modified ehrlich reaction, in which diethylaminobenzaldehyde in conjunction with a colour enhancer reacts with urobilinogen in a strongly acid medium to produce pink red colour.

Methodology

The collection of urine in wild captive animals is quite a laborious job. First of all, the cage of the animal is to be properly cleaned and dried. Either a surgical tray or a bucket which is properly cleaned, dried and sterlised is to be fixed near a slope on the floor where urine usually comes out. Maximum efforts were made to test at least fresh sample collected in the morning in this way.
The urine strip is to be dipped upto the last colour band or parameter. The last drop needs to be drain off. The strip is now to be kept in a slanting position. After 30 seconds, first reading appears and all other readings would appeared and recorded accordingly. Time is very crucial factor with these strips. So, it is very important to observe the time exactly as shown in Table 1 by using a stop watch.

Observation

Reading of urine analysis of 440 urine samples based on "Ames-Multistix", collected during last three years with effect from January 1999 to January 2002 of different group of

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animals in the National Zoological Park, New Delhi have been tabulated to find out the average values. The average values are shown in table 2. The procedure adapted to find out the average values is based on a mathematical impression:

$$\text{Average}(x) = \frac{x1 + x2 + x3 + \ldots\ldots x^n}{n(x)}$$

Conclusion

The above study reveals different biochemical parameters in urine and their analytical presence in the wild animals of different groups housed in the National Zoological Park, New Delhi.

Discussion

The normal values of different parameters of urine of wild animals either in wild or in captivity are not easily available. However, this study was made for last three years and 440 samples were analysed to determine the presence and absence of the 8 parameters the variation of which might play an important role in the health of the animal.

Reference

Ames diagnostics, literature for providing chemical properties of the principle involved.

Acknowledgement

The authors are thankful to Mr. B.S. Bonal, I.F.S., Director, National Zoological Park, New Delhi for his encouragement and necessary cooperation. The authors are thankful to Lt.Col.(Rtd.) Dr. R.S. Rawat for his valuable suggestions. The authors are also thankful to the staff of hospital section and Animal section for rendering massive cooperation.

Table 2: Average urine parameters of different wild animals recorded at National Zoological Park, New Delhi

Species	Glucose G/dl(%)	Bilirubin	Ketone Mg/dl	Sp.gravity	Blood	pH	Protein Mg/dl	Urobilinogen Mg/dl
Tiger	Nil	0.18	0.75	1.012	Nil	7.68	59.8	0.2
Hyb. Lion	Nil	0.5	5.0	0.875	Nil	6.76	59.8	0.2
Lion	Nil	0.08	5.0	0.777	Nil	6.5	50.7	0.2
Wh. Tiger	Nil	0.5	5.0	1.048	Nil	7.64	130.18	0.2
Panther	Nil	Nil	Nil	0.897	Nil	8.0	102.22	0.2
Jaguar	Nil	Nil	Nil	1.01	Nil	8.108	44.78	0.2
In.elephant	Nil	0.5	Nil	1.013	Nil	7.74	43.96	0.2
Af.elephant	Nil	Nil	Nil	1.019	Nil	7.970	21.17	0.2
In.Rhino	Nil	0.5	Nil	1.013	Nil	7.852	32.35	0.2
Chimpanzee	Nil	0.5	Nil	0.826	Nil	6.272	Nil	0.2
Him.Bear	Nil	Nil	Nil	0.91	Nil	7.3	Nil	0.2
C.Buffalo	Nil	Nil	Nil	1.017	Nil	8.25	Nil	0.2
Hyaena	Nil	5.0	Nil	1.010	Nil	8.25	Nil	0.2
Eland	Nil	5.0	Nil	1.025	Nil	8.0	Nil	0.2
Wolf	0.3	3.0	3.0	1.0	Trace	7.5	30	0.2