INTRODUCTION

Hypoglycaemia is a well-known risk factor in neonatal puppies and kittens, and glycaemia control becomes crucial during the first days of life but its small size and limited circulating volume is often a limiting factor for the repeated extraction of blood samples for glucose measurement. Kidneys immaturity provokes the presence of physiological glycosuria during the first 2-3 weeks of life in small animals. The aim of this study was to evaluate the potential of glycosuria as a predictor of glycaemia in newborn puppies during the first two weeks of life.

MATERIAL AND METHODS

Thirty-three client-owned healthy neonatal puppies admitted to the Veterinary Teaching Hospital, Autonomous University of Barcelona, were prospectively included in the study and divided into four different groups according to the day of sampling (1, 4, 7, and 11 days post-delivery). Glucose levels in blood and urine samples (Image 1) were evaluated and compared between groups. Correlation between glucose levels in blood and urine was also determined. Glucose concentration from both blood and urine samples were determined by means of a glucometer (Accu-Check®, Aviva, St Cugat del Vallés, Spain).

RESULTS

A total of 64 blood and urine samples were collected and finally included in the present study obtained. The number of blood and urine samples was 35, 14, 6 and 9 for Day 1, Day 4, Day 7 and Day 11, respectively. Hypoglycaemia was diagnosed only on day 1 after delivery in 17.14% of the puppies. Table 1 shows (mean ± SEM) glucose concentrations in urine and blood samples.

<table>
<thead>
<tr>
<th>Day</th>
<th>Blood glucose (mg/dL)</th>
<th>Urine glucose (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normoglycaemia</td>
<td>Hypoglycaemia</td>
</tr>
<tr>
<td>Day 1</td>
<td>85.48±4.16</td>
<td>45.83±4.25</td>
</tr>
<tr>
<td>Day 4</td>
<td>105.07±12.77</td>
<td>122.50±55.08</td>
</tr>
<tr>
<td>Day 7</td>
<td>130.0±5.30</td>
<td>58.33±23.62</td>
</tr>
<tr>
<td>Day 11</td>
<td>124.11±5.43</td>
<td>97.11±25.22</td>
</tr>
</tbody>
</table>

Table 1. Mean glucose concentration in blood and urine samples. Values are expressed as mean ± sem. Day 1 samples are split into normoglycaemic and hypoglycaemic values.

A positive statistical correlation between blood and urine glucose concentration on day 1 after delivery was observed. Statistical correlation of glucose concentration between blood and urine levels on day 1 after delivery yielded the following mathematical formula to calculate blood glucose concentration from urine glucose concentration, with glucose concentration expressed in mg/dL:

\[ \text{Blood glucose concentration} = (0.314 \times \text{Urine glucose concentration}) + 56.436. \]

No significant correlation between blood and urine glucose was observed on days 4, 7 and 11 after delivery.

CONCLUSIONS

Urine concentration of glucose is a useful parameter to establish glycaemic status on the first day of life in canine puppies helping to decrease blood sampling. A positive significant correlation between glycaemia and glycosuria was observed on the first day of life, yielding a formula to calculate blood glucose concentration from urine glucose concentration. However, further studies are needed to evaluate this correlation in nonhealthy neonates and puppies older than 1 day of life.