Effect of seasons on blood biochemical parameters in male dromedary camels in Algeria

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ABSTRACT

The present study aimed to investigate the effect of different seasons on blood biochemical parameters of male dromedary camels in Algeria. A total number of 30 clinically healthy camels from five to seven years old were sampled in this study and biochemical analysis were performed using an automatic analyzer. The obtained results showed that the urea, creatine kinase and alanine amino transferase concentrations increased significantly during summer compared to other seasons. However, lactate dehydrogenase concentration increased significantly during winter versus other seasons. On the other hand, no significant effect of season was found on glucose, triglyceride, cholesterol, creatinine, aspartate amino transferase and alkaline phosphatase concentrations.

Key words: Algeria, Biochemistry, Blood, Camel, Seasons.

INTRODUCTION

The camel (Camelus dromedarius) is a domestic animal of great economic importance in some of the hotter, drier regions of the world, where the climate adversely affects the survival of other livestock, where it represents an essential source of meat and milk (Faye, 2011; Kadim et al., 2013; Faye, 2014). Therefore, camel is a very hardy animal and well adapted anatomically as well as physiologically to harsh climatic conditions of desert (Gaughan, 2011; Osman et al., 2015).

On the other hand, variation in the environmental factors are found to exert a pronounced effect on the blood characteristics in order to adjusting the different functions of the animal’s body with less physiological efforts (Badawy et al., 2008).

The blood components are the mirror that reflects the health condition of animals (Momenah, 2014). Moreover, the biochemical studies under different fluctuating climatic conditions can often provide valuable information regarding physiological status of animals (Aichouni et al., 2013).

Few studies have been undertaken to determine the effect of season on the blood constituents of the camel. Therefore, the aim of the present study was to investigate the effect of seasons on fluctuations of blood biochemical parameters of male dromedary camels in Algeria.

MATERIALS AND METHODS

This study was conducted at El Oued municipality slaughterhouse in the south east of Algeria, during the period from January 2015 to September 2015. This region is characterized by a climate desert Saharan type. In cold season the temperature drops below 17°C while in hot season it reaches 34°C; average rainfall varies between 80 and 100 mm/year (period from October to February) (Mayouf et al., 2014). Thirty clinically healthy male camels (Camelus dromedaries) of Sahraoui population, aged between 5 to 7 years were included in this study. The animals were kept under similar dietary and managerial practices. Concentrated barley and hay-straw were fed to the animals. The animals were allowed to walk for 2 km and then kept in the lairage for 10-12 hours before slaughter. Ten camels were sampled at each season of the year: winter, spring and summer.

Blood samples were collected from the jugular vein and serum was separated. The samples were placed in ice and immediately transferred to laboratory for analysis on the same day. Commercial diagnostic kits (Landwind medical, Shenzhen, China) were used for determination of various biochemical parameters including serum glucose, triglyceride, cholesterol, urea, creatinine, serum creatine kinase (CK), aspartate amino transferase (AST), alanine amino transferase (ALT), alkaline phosphatase (ALP), and lactate dehydrogenase (LDH). The biochemical analysis was performed with an Automatic chemical Analyzer (LANDWIND, LW C100 plus, Shenzhen, China).

Data were analyzed by the Statistical software program (SPSS, version 16). Data were expressed as the means ± standard deviation. Comparisons among groups were tested using an analysis of variance (ANOVA). Statistical means of two seasons (one-one) were compared using the independent-samples T test or Mann-Whitney U test after evaluating of normal distribution. The overall level for statistical significance was set at P<0.05.
RESULTS AND DISCUSSION

Seasonal variation in the concentration of blood biochemical parameters are given in Table 1. The results indicate that season has a significant effect (P<0.05) on urea, creatinine kinase, ALT and lactate dehydrogenase concentrations. However, there was no significance of season on glucose, triglyceride, cholesterol, creatinine, AST and alkaline phosphatase concentrations (Table 1).

The highest mean values of urea and creatinine kinase (P<0.05) were recorded during summer. However, the urea and creatinine kinase values during winter season were non-significantly lower as compared to spring season. The highest mean value of the ALT (P<0.05) was obtained during summer, while the lowest values was observed during winter season. In contrast, the highest (P<0.05) mean value of lactate dehydrogenase was recorded during winter, while, no significant effect (P>0.05) of season was found on lactate dehydrogenase values of spring and summer season.

In this study, non-significant effect of season on glucose concentrations was observed. This result is in agreement with that reported by Hozifa et al. (2016a) in the dromedary she-camel who found that the glucose concentrations in camels did not show significant change between the seasons. This finding may be attributed to the fixed diet given throughout the study period. Controversial results were reported by Amin et al. (2007), Abdoun et al. (2012), Aichouni et al. (2013) and Bargaa et al., (2016) who registered a significant reduction on glucose concentrations during summer season as compared to winter or autumn season. Hozifa et al. (2016b) reported similar trend in the female dromedary camels that showed that the glucose concentrations decreased significantly during summer as compared to the winter or autumn season.

Contradicting results were found amid different researchers with regard to the effect of the season on glucose concentrations. This discrepancy in the season effects on blood glucose in camels may be due to breed differences and to the environmental conditions particularly feeding and watering systems. The diminution in plasma glucose concentration during the dry season can be attributed to decreases in available forage (Amin et al., 2007; Aichouni et al., 2013). In contrast, the increased blood glucose level during summer may be due to decreased basal metabolic rate and reducing the use of glucose for energy production under hot climatic conditions. The overall mean of glucose concentration reported in this study was in line with that recorded by Aichouni et al. (2010).

The season did not affect the triglyceride concentration in this study, which was in accord with the finding of Bargaa et al. (2016). The cause of this result may be due to the effect of similarity of dietary conditions of animals sampled. However, these results disagreed with those obtained by Aichouni et al. (2013) and Tajik et al. (2013) who found significant increase in triglyceride concentration during summer as compared to winter seasons. On the other hand, Amin et al. (2007) found that the triglyceride increases significantly during summer as compared with autum. Similarly, opposing results to the current study were reported by Hozifa et al. (2016a; 2016b) for the dromedary she-camel who showed that triglyceride concentration was significantly lower during summer than winter and summer seasons. Aichouni et al. (2013) attributed the increases in the concentration of triglycerides of serum during the summer season to low dietary requirements. The overall mean of triglyceride concentration found in this study was lower as compared to the ranges reported by Asadi et al. (2009) and Aichouni et al. (2010).

There was no significant seasonal variation on cholesterol concentration in this work. Similar result was reported by Tajik et al. (2013) and Bargaa et al. (2016) who reported that there was no variation with the season on serum cholesterol. However, these trends disagreed with those of Aichouni et al. (2013) who reported that the cholesterol concentration determined during summer was significantly increased compared with winter, while Al-Harbi (2012) had reported that cholesterol concentrations were higher during winter than summer in dromedary camel. On the other hand, Hozifa et al. (2016a; 2016b) found that the cholesterol concentration of the dromedary she-camels was significantly higher during autumn than in winter and summer seasons. The seasonal variations in serum cholesterol concentration may be due to the type of feed during different seasons. The overall mean of cholesterol concentration recorded in this study was within the range registered by Asadi et al. (2009).

The effects of different seasons on urea concentration were significantly higher during summer than winter and spring seasons. These results confirm those reported by Badawy et al. (2008) in the female dromedary camels. However, Aichouni et al. (2013) showed a significant increase in urea concentration during winter as compared to summer season. On the other hand, Bargaa et al. (2016) showed there was no significant seasonal variation of urea concentration. The elevation of blood urea might be due to the combined pre-renal effects of reduced infusion with lower glomerular filtration and greatest load due to increased metabolic activity (Al Qarawi and Ali, 2003). The urea overall mean recorded in this study was higher than the range reported by Aichouni et al. (2010).

Moreover, there was no significant difference in creatinine concentration according to season. These results are in agreement with those reported by Bargaa et al. (2016) who reported that seasons did not cause any significant effect on creatinine level in camels. This result may also be attributed to dietary conditions of animals included in this study.
However, these findings disagreed with those obtained by Babeker et al. (2013), Mutassim and Madanat (2014) who found that the creatinine increased significantly during the dry hot season. So, Aichouni et al. (2013) attributed the increase in the concentration of serum creatinine during the wet season to the higher intake of protein in the diet consumed by camels. The overall mean value of creatinine concentration reported in this study was higher than the range reported by Aichouni et al. (2010). The current study showed that season had a significant (P<0.05) effect on creatinine concentrations. The increase of creatinine kinase during summer season may be attributed to exposure to heat temperature. According to Chai et al. (2010), CK is released into the blood when there is muscle damage or when there is vigorous exercise. It is clear that some kinds of damage that affect welfare result in CK release. On other hand, this result is in accordance with those of Ibrahim et al., 2016 who reported a significant effect of season on creatine kinase concentration in camels. The overall mean value of creatine kinase found in our study was higher than the range mentioned by Aichouni et al. (2012). In this study, the effect of different seasons on production of CK was recorded. This result also can be attributed to the health status of animals sampled in this work. According to Badakhshan and Mirmahmoudi (2015) higher values of ALP concentration have been reported only in the case of liver or muscle disorders. However, these results disagreed with those of Zeidan et al. (2008) and Abdallah et al. (2012) who reported that alkaline phosphatase concentration was higher during non-breeding than breeding season. The overall mean of ALP found in this work was higher than that mentioned by other studies (Elrayah et al., 2012; Badakhshan and Mirmahmoudi, 2015). In current work, non significant effect of seasons on enzymatic activity of ALP was recorded. This result also can be attributed to the health status of animals sampled in this work. According to Badakhshan and Mirmahmoudi (2015) higher values of ALP concentration have been reported only in the case of liver or muscle disorders. However, these results disagreed with those of Zeidan et al. (2008) and Abdallah et al. (2012) who reported that alkaline phosphatase concentration was higher during non-breeding than breeding season. The overall mean of ALP found in this work was higher than that mentioned by other studies (Elrayah et al., 2012; Badakhshan and Mirmahmoudi, 2015). In this study, the effect of different seasons on enzymatic activity of LDH was significant, being higher during winter than in spring and summer seasons. This result can be attributed to physiological damage of testicular tissue and other related structures of the genital system in winter.
season (Ibrahim et al., 2016). So, these results agreed with those of Al-Harbi (2012) who reported that there was a marked increase in LDH concentrations of the male dromedary camels during rutting season. The overall mean of LDH obtained in present study was higher than the average reported by Aichouni et al. (2010), Al-Harbi et al. (2012) and that reported by Elrayah et al. (2012).

CONCLUSION

In conclusion, seasons have an significant effect on some serum biochemical parameters significantly reflecting on urea, creatine kinase, ALT and lactate dehydrogenase concentrations. However, there was no significant seasonal variation in glucose, triglyceride, cholesterol, creatinine, AST and alkaline phosphatase concentrations.

REFERENCES


