

Coagulation Variables in Camel Neonates and Their Dams

Khaled A. Al-Busadah

Camel Research Center, King Faisal University
Al-Ahsa, Saudi Arabia

Abstract:

A wide range of haemostatic variables were studied in a number of 62 neonate camels and their dams at the time of delivery. The results indicated significant prolongation of the coagulation time, template bleeding time, activated coagulation time, prothrombin time, activated partial thromboplastin time, reptilase time, and a reduction in platelets count with no change in fibrin degradation products was observed in neonates in comparison with their dams. This indicates a significant diminution in coagulation mechanism in neonate which is considered to be of physiological nature at this early age.

Key words: coagulation, camel, blood.

Introduction :

Several studies on the camel have shown that hematological parameters exhibit considerable variations at different periods of life (Elias and Yagil 1984, Hussein *et al.*, 1992, Bay *et al.*, 2000).

Furthermore, environmental and nutritional factors could affect haematological parameters (Evans *et al.* 1999). In addition to that, normal reference levels for haemostatic variables are needed for both maternal and neonatal blood in the presence of a normal uneventful delivery. So that disorders of haemostasis can be detected.

Disease, nutritional or environmental agents may activate the clotting system (Brown, 1975), after haemostasis through their effects on platelet or endothelial function (primary haemostasis), or through activation of secondary haemostasis or inhibition of fibrinolysis (Taylor *et al.*, 2000). Such agents are considered as risk factors for fetal loss (Tibary and Annousi, 1997). The purpose of this study is to determine the normal values of various blood coagulant variables in neonate camels and their dams at the time of delivery.

Materials and methods

The present experiment was conducted on 62 (34 female camels of 4-7 years old) (*Camelus dromedaries*) and their newborns at day 1 postpartum (28 camels). The animals were maintained by individual farmers and kept in open pens. Blood samples were collected from each camel and neonatal calves at

birth simultaneously (before feeding colostrum) by venipuncture of Jugular vein.

Platelet counts: Platelet Counts were performed on sodium citrate – anticoagulant blood using the automated hematology analyzer (Baker 9010 hematology analyzer Biocmmunochen, Allentown USA).

Template bleeding Time (TBT): TBT was measured by a template bleeding device (Surgicutt International, Technidyne Corp. Edison, NJ, UA), Blood from incision on skin was collected periodically onto filter paper. The TBT was measured from the discharge of the device until bleeding had stopped.

Clotting variables: blood clotting time (CT) was determined by capillary tube method (Schalm *et al.*, 1975) in fresh blood taken from tip of the ear. Fresh blood obtained from Jugular vein was also used for determination of clotting variables (Feldman *et al.*, 2000).

For determination of the activated clotting time (ACT), prothrombin time (PT) partial thromboplastin time (PTT), and fibrin degradation products (FDP). For ACT assays, blood was aspirated and placed in 20-ml syringes and quickly injected into 2 warmed (37° C) evacuated tubes containing diatomaceous earth (Sigma, UK), tubes were mixed by gentle inversion and incubated at 37° C for 1 minute. Tubes then were removed from the water bath, rocked gently, and returned to the water bath. The ACT was recorded as mean time to initial clotting in each tube. The PT was determined by addition of 0.2 ml of warmed rabbit thromboplastin reagent (Sigma, UK), to 0.1 ml of warmed (37° C) plasma (Sodium citrate) and measurement of the interval until clot detection, using a fibrometer (Simplastin, Organon Teknika corp, Durhan, USA). The PTT was determined as follows: 0.1 ml of sample plasma was added to 0.1 ml of warmed action-activated cephaloplastin reagent, incubated for 3 minutes at 37° C, and mixed with 0.1 ml of warmed CaCl₂ solution, and the interval until clot detection was measured. For each camel and the mean value calculated. Control values for PT and PTT were established, using human plasma (sodium citrate).

The fibrin degradation products (FDP) and reptilase time (RT) were measured by a modification of Laurell's technique (Laurell 1965) using commercial kits (Murex Biotech Limited, Kent, UK) A Kruskal – wallis statistical test was used to determine whether the parameter varied significantly by age. Values of $P < 0.05$ were considered significant.

Results :

The results of coagulant variables of 62 she-camels and their neonates (weighing 30-37 Kg) are given below (table 1). The mean values of platelet count, TBT, ACT, CT, PT, PTT, RT and FDP in neonate camels were significantly different from their dams. Platelet count of neonates were significantly lower ($P < 0.05$) than the values of their dams. on the other hand, The results indicated that ACT, TBT, CT, PT, PTT, RT and FDP values of neonate camels were significantly higher than the observed values of their dams.

Table (1)
The level of different anticoagulant parameters

Coagulant variable	Neonates	Dams
Platelet count (10^5 cells/ μ l)	$0.9 \pm 0.05^*$	1.6 ± 0.06
TBT (min)	$6.2 \pm 0.6^*$	4.3 ± 0.5
ACT (sec)	$200 \pm 20^*$	160 ± 20
CT (min)	$6.2 \pm 0.6^*$	4.01 ± 0.5
PT (sec)	$16.6 \pm 03^*$	8.2 ± 2
PTT (sec)	$70 \pm 9^*$	40 ± 5
RT (sec)	$21 \pm 3^*$	12 ± 2
FDP (μ g/ml)	$15.3 \pm 2.1^*$	$14.3 \pm 2.3^*$

Mean $\pm$ SD of platelet count, clotting time (CT), Template bleeding time (TBT), activated coagulation time (ACT), Prothrombin time (PT) fibrin degradation products (FDP), reptilase time (RT), activated partial thromboplastin time (PTT) and fibrin degradation products in neonatal camels and their dams (N=62), $*P < 0.05$.

Discussion:

The overall coagulation profile in the she camel is comparable to the cow (Feldman *et al.*, 2000). Comparatively, clotting times of domestic animals are longer in the following order: cat; dog and pig; horse and sheep; cow and camel; and finally birds and chickens (Gentry and Downie, 1984; Swenson and Reece, 1996). Platelets count is a direct measure of primary haemostasis as they aggregate to form a plug that stops bleeding. The TBT is an indirect measure of primary haemostasis and is dependant on the number of circulating platelet (Kopp *et al.*, 1985). The value of TBT of 4.3 minutes reported here

may vary within the same species or from species to another (Taylor et al., 2000).

Statistically significant differences were observed between mean values for neonates and their dams in coagulation variables. Similarly the coagulation profiles of newborn calves, kittens, pups, guinea pig, rabbits and prigs exhibit marked differences from those of the comparable adult animals. In each of these species, reduced levels of prothrombin and related clotting factors were found in relation to adult (Gentry and Downie 1984).

Prolongation of prothrombin time, PTT and ACT in the neonates is attributed to deficiency of the clotting factors operating in intrinsic pathway of clotting system. This in turn is due to immature synthetic capabilities of the liver rather than vitamin K deficiency (Hathaway and Bonnar, 1980; Forestier *et al.*, 1985). Prothrombin time is a primary measure of extrinsic and common pathways of coagulation, whereas PTT is a measure of intrinsic and common pathways, activated coagulation time will be prolonged when there is a difference in activity of factors V, XI, IX, prothrombin or fibrinogen (Bateman *et al.*, 1999), the ACT test is a simple, inexpensive and rapid haemostatic test for disorders involving intrinsic or common pathway of coagulation.

Reptilase time was significantly prolonged in neonates in this study. Such prolongation in the absence of significantly elevated FDP, is indicative of a defective fibrin polymerization (Beck, 1982). This is not unexpected since fetal fibrinogen is qualitatively different from adult fibrinogen.

The relative deficiency in the various components of the haemostatic mechanism established in this study occurs in otherwise healthy symptom-free neonates. Therefore these alterations should be considered as physiological properties (Buchanan, 1978). Indeed, none of 28 neonates had any clinical evidence of defective haemostasis. The reference values obtained would be used in interpreting veterinary laboratory results and in monitoring the effect of therapeutic interventions in various hemorrhagic and thrombotic disorders of the neonate.

Acknowledgements:

The author thanks the Deanship of Scientific Research for financial support.

References:

1. Bateman, S.W., Mathews, K.A., Abrams-Ogg, ACG. (1992). Evaluation point of care tests for diagnosis of disseminated intravascular coagulation in dogs admitted to an intensive care unit. *J Am Vet Assoc.* 215:805-810.
2. Bay, J.D., Scott, M.A. and Hans. J.E. (2000). Reference values for activated coagulation time in cats. *Am J. Vet. Res.* 61,750-75.
3. Beck, E.A. (1982). Congenital disorders of fibrin formation and stabilization. In : Coleman, R.W. Et al., (eds). *Haemostasis and Thrombosis : basic principles and clinical practice.* Philadelphia, Toronto: Lippincott, 185-209.
4. Brown, D.L. (1975). Complement and coagulation. *British Journal of Haematology* 30:377-82.
5. Buchanan, G.R. (1978). Neonatal coagulation : normal physiology and pathophysiology. *Clin Haematol* 7:85-109.
6. Elias, E. and Yagil, R. (1984). Haematological and serum biochemical values in lactating camels (*Camelus Dromedarius*) and their newborn . *Ref. Vet.* 41:7-13.
7. Evans, D.M. Farazer, I.H., Martin, N.G. (1999). Genetic and environmental causes of variation in basal levels of blood cells. *Twin. Res.* 2;250-257.
8. Feldman, B.F. Zinkl, J.G. and Jain N.C. (2000). *Schallm's veterinary haematology*:. Lippineott Williams and Wilkins (5th ed), London pp. 529-26.
9. Forestier, F. Daffos, F. Rainaut, M. (1985). Al. Vitamin K depended proteins in fetal haemostasis at mid trimester of pregnancy. *Thromb Haemost* 53:401-3.
10. Gentry, P.A. and Downie, H.G. (1984). Blood coagulation. In : *Dukes physiology of domestic animals by Melvin Swenson* (10th ed). Cornell University Press. pp 41-50.
11. Hathaway, W.E. Bonnar, J. (1980). Perinatal coagulation. New York; Grune and Stratton, 53-80.
12. Hussein, M. F. Liman, M. M. Mogawer H. H. Bakkar M. N. and Garel Nabi, A.R. (1992). The hematology of growing camels (*Camelus dromedaries*) during the first year of life. *AJAS.* 5,519-525.
13. Kopp, K.J. Moore, J.N. Byars, T.D. (1985). Template bleeding time and thromboxane generation in the horse: effects of three non steroidal anti-inflammatory drugs. *Equine Vet J.* 17,322-324.
14. Laurel, C.B. (1965). Antigen – antibody crossed electrophoresis. *Anal Biochem.* 10:358-61.

15. Schalm, O. W. Jain, N. C. and Carrol, J. E. (1975). *Veterinary Hematology*. Lea and Febiger Philadelphia (3rd ed).
16. Swenson, M. J. and Reece, W. O. (1996). *Duke's physiology of domestic animals* (11th ed). 1st Indian Reprint, Panima Publishing Corporation, New Delhi and Bangalore.
17. Taylor, E.L. Sellon, D.C. Wardropm, K. J. Hines, M. T . and Kingston, J. K. (2000). Effects of intravenous administration of formaldehyde on platelet and coagulation variables in healthy horses. *A.m J. Vet. Res.* 61, 1191-1196.
18. Tibary, A. and Anouassi, A. (1997). In : *Theriogenology in Camelidae*. by Tibary A. and Anoussi A (1st ed). United Arab Emirates, Ministry of Culture and Information Press. PP 467-468.

متغيرات تجلط الدم في صغار الجمال (السليل) وأمهاتها

خالد بن أحمد البوسعدة

مركز أبحاث الجمال، جامعة الملك فيصل

الأحساء، المملكة العربية السعودية

الملخص :

تمت دراسة متغيرات تجلط الدم في عدد ٦٢ من صغار الجمال (السليل) وأمهاتها أثناء وقت الولادة. وقد أظهرت الدراسة إطالة مدة تجلط الدم وفترة النزف وتجلط الدم النشط ومدة البروثرومبين ومدة البروثرومبين النشط ومدة الريبثاليز مع عدم وجود تغير واضح في معدل نواتج تحطم الفبرين في صغار الجمال (السليل) مقارنة مع أمهاتها. تشير هذه النتائج إلى ضعف ميكانيكية تجلط الدم في صغار الجمال (السليل) والتي يمكن اعتبارها صفة فسيولوجية في هذا العمر المبكر.