Journal of Animal and Veterinary Advances 10 (21): 2765-2767, 2011
ISSN: 1680-5593

Comparison Between Manual and Electronic Haematological Analysis in Some Animals

Mahmoud R. Abd Ellah, Maha Lamlom Abd Elghani, Maani Ali Sayed,
Moshira Kamel Hassan and Maram Ahmed Mahmoud
Department of Animal Medicine, Faculty of Veterinary Medicine,
Assiut University, 71526 Assiut, Egypt

Abstract: The present study was carried out to compare hematological results of manual methods with the standard Medonic Vet analyzer. The study include animal species that already had their programs installed on the Medonic Vet like horse and cows and also include other animal species that their programs newly installed on the Medonic Vet, like sheep and camels. A total number of 12 animals (donkeys, cows, sheep and camels) belong to the Veterinary Teaching hospital, Assiut University, Egypt were subjected to study. Haematological analysis was performed using manual and electronic method (Medonic CA 620, Sweden) directly after collection. The results of this study indicate that manual methods for total erythrocytes count (T. RBCs), haematocrit and total leucocytes count (T. WBCs) have no significant variation with electronic blood cells counting for donkeys and cows blood. On the other hand, there were significant variations in T. RBCs and T. WBCs counts between manual and electronic methods for sheep and camel blood. In conclusion, Medonic CA620 is suitable for hematological analysis of blood from donkeys and cows and not suitable for blood from sheep and camels. Manual differential leucocytic count must associate electronic blood cells counting.

Key words: Camel, donkey, sheep, cow, medonic, blood, Egypt

INTRODUCTION

Blood examination is performed to assess general health (Gutierrez *et al*., 1971; Jain, 1993; Peinado *et al*., 1999) and the body's ability to flight infection. The Complete Blood Count (CBC) is an important and powerful diagnostic tool as a component of a minimum database. It can be used to monitor response to therapy, to gage the severity of manifestations of illness or as a starting point for formulating a list of differential diagnoses (Aengwanich *et al*., 2009). Within the field of veterinary hematology, the challenge is to adapt the system of electronic blood cells counter to many different animal species with maintaining a high degree of accuracy and reproducibility. Medonic VET blood cells counter (Medonic CA620) utilizes unique, sophisticated software that makes it possible to set up programs for a wide range of species. The present study was carried out to compare haematological results of manual methods with the standard Medonic Vet analyzer. The study include animal species that already had their programs installed on the Medonic Vet, like horse and cows and also include other animal species that their program newly installed on the Medonic Vet, like sheep and camels.

MATERIALS AND METHODS

Animals and samples: A total number of 12 animals (donkeys, cows, sheep and camels) belong to the Veterinary Teaching hospital, Assiut University, Egypt were subjected to study. Whole blood samples were drawn from the jugular vein in vacutainer tubes containing EDTA. Each group of animal species included 3 animals. Haematological analysis was performed directly after collection using haemocytometer and automatic blood cells counter (Medonic CA 620, Sweden).

Haematological analysis: The following parameters were included in the study; Total Red Blood Cells count (T. RBCs count). Hematocrit (Hct), Total White Blood Cells count (T. WBCs count), total granulocytes, lymphocytes and monocytes counts.

Manual method

Blood cells counting: Manual counting of RBCs and WBCs were performed using hemocytometer according to Coles (1986) with some modification. For T. RBCs counting, blood sample was diluted 1:200 using normal saline 0.9%, the dilution was done in a Wassermann tube

Corresponding Author: Mahmoud R. Abd Ellah, Department of Animal Medicine, Faculty of Veterinary Medicine, Assiut University, 71526 Assiut, Egypt

(5 μL blood+995 μL saline) and then, gently mixed by inverting the tube several time about 10 μL diluted blood was allowed to flow under the coverslip by capillary action, T. RBCs count was performed at 40X. For T. WBCs count, blood sample was diluted 1:20 using Turk's solution, the dilution was done in a Wasserman tube (5 μL blood+95 μL saline) and then gently mixed, about 10 μL diluted blood was allowed to flow under the coverslip by capillary action, T. WBCs count was performed at 10X.

Hematocrit: Hematocrit (HCT) was performed according to Coles (1986) using microhematocrit method and by means of Microhematocrit centrifuge.

Differential Leucocytes Count (DLC): DLC was performed according to Coles (1986) briefly, small drop of blood was spread on a clean slide, air dried fixed in absolute methanol and stained in 10% geimsa stain solution. The absolute counts of individual cells were calculated after obtaining the relative leucocytes count.

Electronic blood analysis: Hematological analysis was done using veterinary blood cells counter (Medonic CA 620, Sweden).

Statistical analysis: Statistical analysis was conducted using SPSS 16.0 for windows (SPSS, Chicago, USA). Statistical analysis was performed by comparing data from manual methods with automated one using ANOVA. Statistically significant differences were determined at $p<0.05$. Data were expressed as Mean±SD.

RESULTS AND DISCUSSION

Donkeys: Comparing data from manual method with Medonic counter, revealed insignificant changes in all measured parameters (Table 1).

Cows: There were insignificant changes in all measured parameters except the monocytes count which was significantly lower in manual method ($p<0.01$) than that of Medonic counter (Table 2).

Sheep: Total RBCs count and HCT ($p<0.05$) from Medonic blood cells counter were significantly lower than manual method. T. WBCs count and granulocytes count ($p<0.05$) were significantly lower using manual method than automatic blood cells counting (Table 3).

Camel: There were significant decrease in T. RBCs count ($p<0.05$) and HCT ($p<0.01$) using blood cells counter when compared with manual method. On the other hand, T. WBCs count showed insignificant changes however, the monocytes count was significantly lower in manual method ($p<0.05$) than that of automated method (Table 4).

The results of this study indicate that manual methods for T. RBCs count, HCT and T. WBCs count have no significant variation with electronic blood cells counting for donkeys and cows blood (Table 1 and 2). Dilution of blood for RBCs and WBCs count in the present study were done in a Wasserman tube, dilution of blood in a tube has the advantages of being safe, the amount of blood in the tube method is controlled better

Table 1: Results of hematological analysis using manual and automatic methods in donkey's blood

Methods	T. RBCs count (10^6 mm^{-3})	HCT (%)	T. WBCs count (10^3 mm^{-3})	Lymphocytes count (10^3 mm^{-3})	Granulocytes count (10^3 mm^{-3})	Monocytes count (10^3 mm^{-3})
Blood cells counter	5.55±1.08	29.50±2.22	16.77±8.57	5.43±2.07	10.42±6.98	1.05±0.58
Manual methods	5.39±1.14	30.75±3.30	14.95±5.69	5.17±1.26	9.05±4.67	0.72±0.51

Table 2: Results of hematological analysis using manual and automatic methods in cow's blood

Methods	T. RBCs count (10^6 mm^{-3})	HCT (%)	T. WBCs count (10^3 mm^{-3})	Lymphocytes count (10^3 mm^{-3})	Granulocytes count (10^3 mm^{-3})	Monocytes count (10^3 mm^{-3})
Blood cells counter	8.50±1.42	30.75±7.75	19.80±4.30	4.20±0.50	14.05±3.25	1.550±0.55
Manual methods	7.07±0.69	32.50±9.50	14.05±2.75	2.38±1.81	11.55±1.04	0.056±0.056**

Table 3: Results of hematological analysis using manual and automatic methods in sheep's blood

Methods	T. RBCs count (10^6 mm^{-3})	HCT (%)	T. WBCs count (10^3 mm^{-3})	Lymphocytes count (10^3 mm^{-3})	Granulocytes count (10^3 mm^{-3})	Monocytes count (10^3 mm^{-3})
Blood cells counter	4.10±1.05	15.96±3.89	13.66±1.76	5.20±0.82	6.76±0.630	1.70±0.98
Manual method	8.50±1.44*	29.33±6.80*	8.66±2.71*	5.13±2.46	3.23±1.268*	0.29±0.23

Table 4: Results of hematological analysis using manual and automatic methods in camel's blood

Methods	T. RBCs count (10^6 mm^{-3})	HCT (%)	T. WBCs count (10^3 mm^{-3})	Lymphocytes count (10^3 mm^{-3})	Granulocytes count (10^3 mm^{-3})	Monocytes count (10^3 mm^{-3})
Blood cells counter	3.80±0.17	16.60±0.82	17.23±3.02	5.60±3.29	10.36±1.34	1.26±0.35
Manual method	8.86±0.92*	30.33±0.58**	14.28±1.97	4.68±4.50	9.55±4.82	0.05±0.09*

Data were expressed as mean±SD; *$p<0.05$; **$p<0.01$

than the diluting pipette. The insignificant changes between the manual method of blood counting employed in the present study and that of Medonic Vet counter for donkeys and cows blood indicated that dilution of blood in hemocytometer method can be done in a Wasserman tube which can replace hemocytometer diluting pipette. The new installed programs on blood counter for sheep and camels had significant variation with manual methods of counting Animal used in the present study were healthy animals and their blood counts expected to be within the normal reference range, hematological data was reported to be 9-15×10^6 μL^{-1}, 29-45% and 4-12×10^3 for T. RBCS, HCT and T. WBCs count, respectively in sheep (Schalm *et al*., 1975) and 6.93±0.22, 27.66±0.51 and 11.97±0.46 for T. RBCS, HCT and T. WBCs count, respectively in camels (Shafqaat *et al*., 2004). As shown in Table 3 and 4, Medonic Vet hematology analyzer is not suitable for analysis of blood samples from sheep and camels, another factor support this finding is the HCT%, it is known that manual HCT is more accurate than automatic method (Ravel, 1995), the percent of HCT for sheep and camel blood is lower in Medonic counter analysis than results for microhematocrit centrifuge (Table 3 and 4).

In the four animal species there were significant differences in the monocytes count which indicated that manual DLC is required to support result of Medonic CA620 findings.

CONCLUSION

From the present study, dilution of blood for T. RBCs and T. WBCs counting can be done in Wassermann tube, replacing the hemocytometer diluting pipette. Medonic CA620 is suitable for hematological analysis of blood from donkeys and cows and not suitable for blood from sheep and camels. Manual DLC must associate blood cell counter analysis.

REFERENCES

Aengwanich, W., A. Chantiratikul and S. Pamok, 2009. Effect of seasonal variations on hematological values and health monitor of crossbred beef cattle at slaughterhouse in Northeastern part of Thailand. Am.-Eurasian J. Agric. Environ. Sci., 5: 644-648.

Coles, E.H., 1986. Veterinary Clinical Pathology. 4th Edn., W.B. Saunders Co., Philadelphia, London, ISBN-13: 978-0721618289.

Gutierrez, J.H., A.C. Warnick, J.J. Cowley and J.F. Hentges Jr., 1971. Environmental physiology in the sub-tropics. I. Effect of continuous environmental stress on some hematological values of beef cattle. J. Anim. Sci., 32: 968-973.

Jain, N.C., 1993. Essentials of Veterinary Hematology. Lea and Febiger, Philadelphia, pp: 1-18.

Peinado, V.I., J.F. Celdran and J. Palomeque, 1999. Basic hematological values in some wild ruminants in captivity. Comp. Biochem. Physiol. A: Mol. Integr. Physiol., 124: 199-203.

Ravel, R., 1995. Clinical Laboratory Medicine: Clinical Applications of Laboratory Data. 6th Edn., Mosby Inc., USA., pp: 13.

Schalm, O.W., N.C. Jain and E.J. Carroll, 1975. Veterinary Hematology. 3rd Edn., Lea and Febiger, Philadelphia, ISBN-13: 9780812104707, pp: 144.

Shafqaat, A., A.A. Butt, G. Muhammad, M. Athar and M.Z. Khan, 2004. Haematobiochemical studies on the haemoparasitized camels. Int. J. Agric. Biol., 6: 331-334.