

Prevalence of dog erythrocyte antigen (DEA) I amongst the dog blood donors at Tamil Nadu veterinary and animal sciences university animal blood bank (TABB), India

Abstract

The study of dog blood groups has increased in the last years. Inherited antigens on the RBC surface define blood groups. There are 7 blood groups in the canine DEA system. Amongst these blood groups, DEA 1 blood group is highly immunogenic and consequently has greater clinical importance. A retrospective study was conducted in 125 purebred and mongrel dog blood donors at the TANUVAS Animal Blood Bank, Madras Veterinary College, Tamil Nadu Veterinary and Animal Sciences University, Chennai, India during the period from January 2010 to January 2011. Donor dogs were screened and typed for the presence of DEA 1 using the monoclonal antibody kit. The prevalence of DEA 1 was 61.6%. The prevalence of DEA 1 dogs in India agrees with most of the data reported in the literature.

Keywords: blood groups, dog erythrocyte antigen, blood transfusions

Volume 6 Issue 4 - 2018

Baranidharan GR,¹ Prathaban S,¹ Nambi AP,¹ Dhanan JR,¹ Lubas G,² Medina Valentin AA²

¹Tamil Nadu Veterinary and Animal Sciences University, India

²University of Pisa, Italy

Correspondence: Baranidharan GR, Blood Bank Officer-TANUVAS Animal Blood Bank, Madras Veterinary College, Chennai-600 007, India, Email grbvet@gmail.com

Received: August 01, 2017 | **Published:** July 20, 2018

Introduction

Dogs do not have natural dog erythrocyte antigen (DEA) antibodies but are eventually sensitized following the first incompatible transfusion.¹ The knowledge of the canine blood groups, immunogenicity and incompatibility is clinically useful to carry out safe transfusions without risk of sensitization or the risk of developing a transfusion reaction.² Even if the multiple transfusions are increasing in India, compared to the western countries, the determination of the blood group antigens in dogs using DEA typing kits or anti-sera are considerably minor because of seldom repeated transfusions to the same recipient dog.

Nowadays, there have been various groups and theories that define a universal dog blood donor. It has been reported that the universal dog blood donor should be negative for DEA 1 and DEA 7, and positive for DEA 4. In all practical aspects, the dog with the absence of the highly antigenic DEA 1 is considered to be a safe donor.³ An international standardization committee has designated the DEA system where the dogs are either positive or negative for most of the DEAs, the DEA 1 system contains 4 alleles, with different levels of antigenic expressions from strong (4+) to weak (1+) DEA 1.^{4,5}

The most frequently studied breeds were German shepherd, Golden Retriever, Greyhound, Doberman, and Rottweiler along with investigations in mongrel dogs.⁶⁻⁸

Since the knowledge of prevalence of DEA 1 in different breeds is important for the recruitment of typed compatible blood donors. The aim of the study was to describe the prevalence of DEA 1 amongst the registered dog blood donors at the TANUVAS Animal Blood Bank, Chennai, India.

Materials and methods

One-hundred and twenty-five purebred and mongrel dog blood donors from to the Madras Veterinary College, Chennai were typed for the DEA 1 blood group during the period of time ranging from January

2010-January 2011. All samples were tested previously in saline agglutination test to determine the presence of auto-agglutination. The positive samples were excluded from further investigations.

Blood typing was carried-out with the Alvedia Lab DEA 1 Kit (Lyon, France). This in-house kit is based on the migration of red blood cells on a membrane previously treated with a buffer and incorporated with a monoclonal antibody highly specific to the Dog Erythrocyte Antigen. One drop of whole blood was added to the 3 drops of DEA buffer into the typing kit, the membrane containing the monoclonal antibody was placed into it, the result was read after two minutes. Erythrocytes positive for DEA 1 are captured by this antibody and a red line on the mid portion of this membrane is showed. The blood group results are reported using only a descriptive statistics.

Results

The obtained results of presence of DEA 1 blood group in the random dog blood donor population in TANUVAS Animal Blood Bank; Chennai, India is 61.6% (Table 1).

Discussion

In this study 125 dog blood donors, 77 (61.6%) were DEA 1 positive and 38,4 % were DEA 1 negative. The prevalence for DEA1 positive dogs found in this study was very similar to results reported in other studies carried out in the world (53 to 65% for DEA 1 positive).^{8,9} There are not enough studies showing the prevalence of DEA 1 in India, however a recent study indicates a 78% of DEA 1 positive in dogs of the Punjab city, this result could be influenced by the presence of a majority of breeds with a high prevalence of DEA 1 positive.¹⁰ A recent study with a high number of dogs tested (7,414) reported in Italy, shows a very similar prevalence of DEA 1 positive to this blood bank donors (61,2%).¹¹

In 1996 Hale, described a prevalence of 63.5% for DEA 1.1 positive mongrel dogs. Van der Merwea et al. reported that the overall prevalence of DEA 1.1 was 47%. Prevalence was 47% in purebred

dogs and 48% in mongrels. Distinct breed differences were noted with less than 20% in German shepherd and Boxer and greater than 75% of Rottweiler, Great Dane, St Bernard and Dalmatian testing DEA 1.1 positive in South Africa. Furthermore, the frequency of DEA 1.1 in this population of dogs in the northern part of South Africa was similar to frequencies reported in dog populations elsewhere.

Arikan et al.,⁶ studied 198 dogs of which 61.1% were DEA 1.1 positive and approximately one fourth of dogs (23.2%) were positive for DEA 3. All dogs (100%) were positive for DEA 4. Prevalence of

DEA 5 and 7 positive dogs was 55.5% and 71.7% respectively.

The difference in the DEA 1 prevalence in the world is generally due to the sampling of the tested dogs. The documented clinical case of a DEA 1 negative dog previously sensitized with DEA 1 blood group, emphasized the importance of canine blood type DEA 1.1 concerning to blood transfusion incompatibility.² It supported the recommended practice of cross-matching dogs, particularly prior to a second transfusion, and the use of blood donors, which are DEA 1.1 negative.

Table 1 Results of DEA 1 in the random dog blood donor population is 61.6% for DEA 1 positive and 38.4 % for DEA 1 negative

Breed	Dog tested No.	DEA 1 positive		DEA 1 negative	
		Males No.	Females No.	Males No.	Females No.
Labrador Retriever	44	12	14	8	10
Mongrel	26	9	7	4	6
German Shepherd	12	5	3	2	2
Dobermann	10	4	4	1	1
Golden Retriever	9	2	4	1	2
Great Danes	9	3	2	3	2
Rottweiler	8	2	3	1	2
Dalmatian	6	2	1	1	2
Neo Mastiff	1	0	0	0	0
Total	125	39	38	21	27

Kessler et al.,⁷ reported that in dogs, the lack of alloantibodies that occur naturally and clinically relevant may preclude the need for having extended type-specific blood available for a first transfusion.⁷ But, since there is a risk of sensitization with the presence of antibodies that can appear within 4-14 days, in DEA 1 negative dogs who received blood from DEA 1 positive dogs following the first transfusion, blood typing to identify the presence of DEA 1 and the cross-match to establish full compatibility should be performed before each transfusion.^{1,3,12-16}

Conclusion

The obtained results of DEA 1 in the random dog blood donor population in India are 61.6% which is similar to those reported in worldwide by the western countries.

Because of the DEA 1 blood groups represents the most immunogenic blood group, it is mandatory for the veterinary practice in India to carry out blood typing to identify the presence of DEA 1 antigen and the major and minor cross-match before each transfusion. Also, DEA 1 blood group should be typed in the Indian native dog breeds to determine the prevalence of positive and negative dogs to ensure safe transfusions.

Ethical approvals

The studies were carried out in accordance with the Guidelines laid down by the International Animal Ethics Committee or Institutional Ethics Committee and in accordance with local laws and regulations and proper consent from the clients.

Conflict of interest

The author declares that there is no conflict of interests.

References

- Young LE, O'Brien WA, Swisher SN. Blood groups in dogs—their significance to the veterinarian. *American Journal of Veterinary Research*. 1952;13(47):207–213.
- Giger U, Gelens CJ, Callan MB. Canine blood type frequencies and an acute hemolytic transfusion reaction. *Journal of American Veterinary Medical Association*. 1995;206(9):1358–1362.
- Hale AS. Canine blood groups and their importance in veterinary transfusion medicine. *Vet Clin North Am Small Anim Pract*. 1995;25(6):1323–1332.
- Acierio MM, Raj K, Giger U. DEA1 expression on dog erythrocytes analyzed by immunochromatographic and flow cytometric techniques. *J Vet Intern Med*. 2014;28(2):592–598.
- Polak K, Acierio MM, Raj K, et al. Dog erythrocyte antigen 1: Mode of inheritance and initial characterization. *Vet Clin Pathol*. 2015;44(3):369–379.
- Mesa-Sanchez I, Ruiz de Gopegui-Fernández R, Granados-Machuca MM, et al. Prevalence of dog erythrocyte antigen 1.1 in galgos (Spanish greyhounds). *Vet Rec*. 2014;174(14):351.
- Kessler RJ, Reese J, Chang D, et al. Dog erythrocyte antigens 1.1, 1.2, 3, 4, 7, and Dal blood typing and cross-matching by gel column technique. *Vet Clin Pathol*. 2010;39(3):306–316.

8. Ferreira RR, Gopegui RR, Matos AJ. Frequency of dog erythrocyte antigen 1.1 expression in dogs from Portugal. *Vet Clin Pathol.* 2011;40(2):198–201.
9. Ergul Ekiz E, Arslan M, Ozcan M, et al. Frequency of dog erythrocyte antigen 1.1 in 4 breeds native to different areas in Turkey. *Vet Clin Pathol.* 2011;40(4):518–523.
10. Riyaz A Bhat, Pritpal S Dhaliwal, Charanjit S Randhawa, et al. Prevalence of Dog Erythrocyte Antigen 1 Blood Group in Different Dog Breeds of Punjab State of India. *Philippine Journal of Veterinary Medicine.* 2017;54(1)
11. Medina Valentin AA, Gavazza A, Lubas G. Prevalence of Dog Erythrocyte Antigen 1 in 7,414 Dogs in Italy. *Vet Med Int.* 2017;2017:5914629.
12. Haldane S, Rovers J, Marks SL. Transfusion medicine. *Compendium on Continuing Education for the Practising Veterinarian.* 2004;26:502–518.
13. Swisher SN, Young LE. The blood grouping systems of dogs. *Physiol Rev.* 1961;41:495–520.
14. De Wit GD, Coenegracht NA, Poll PHA, et al. The practical importance of blood groups in dogs. *Journal of Small Animal Practice.* 1967;8(5):285–289.
15. Callan MB, Jones LT, Giger U. Hemolytic transfusion reactions in a dog with an alloantibody to a common antigen. *J Vet Intern Med.* 1995;9(4):277–279.
16. Melzer KJ, Wardrop KJ, Hale AS, et al. A hemolytic transfusion reaction due to DEA 4 alloantibodies in a dog. *J Vet Intern Med.* 2003;17(6):931–933.