Frequency of blood types DEA 1.1, 3, 4, 5, and 7 in Kangal dog

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Keywords: Blood type, canine, Turkish Kangal dog.

SUMMARY

Despite clinical significance of the blood typing, relatively little is known about the prevalence of canine blood groups. This study aimed to determine the frequency of blood types DEA 1.1, 3, 4, 5, and 7 in Kangal dogs, a Turkish shepherd dog. A total of 198 Kangal dogs were surveyed from local government organizations and private breeders living around Kangal town of Sivas province in Eastern Turkey. Blood typing was performed using tube agglutination assay. Of the 198 dogs, 61.1% had DEA 1.1 positive reactions. 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 most common blood types were DEA 1.1, 4 and 7. DEA 4 does not seem to be important for Kangal dogs in terms of transfusion medicine, since all dogs have DEA 4 positivity. The prevalence and antigenic properties of DEA 1.1 and 7 are significantly high, which might create acute hemolytic transfusion reactions if unmatched transfusion is performed in Turkish Kangal dogs.

Keywords: Blood type, canine, Turkish Kangal dog.

Introduction

Blood group antigens are genetic markers located on the red-cell membrane. Canine blood types are referred to as dog erythrocyte antigens (DEA), followed by the number. A dog can be positive for a specific DEA type, meaning that the antigen of that blood type is present on the surface of red blood cells, or can be negative, indicating that the antigen is missing. Well recognized dog blood types are DEA 1.1, 1.2, 3, 4, 5, 6, 7 and 8 [13]. However, typing sera are not commercially available for DEA 6 and 8. The incidence of DEA 4 blood type is more than 98% in most populations [1]. Thus, these dogs are the best candidate for being a donor in transfusion medicine. However, other donors can be used if they are known to be compatible with the recipient [12].

Although DEA 3, 5 and 7 negative dogs have naturally occurring antibodies to DEA 3, 5 and 7 positive red cells, these blood groups do not possess a major transfusion reaction during the first transfusion [11, 20, 22]. The most antigenic blood type from a practical standpoint for transfusion in dogs is DEA 1.1. As these dogs do not have naturally occurring antibodies, subsequent incompatible transfusion will lead to acute hemolytic transfusion reactions in recipient when a DEA 1.1 negative dog is sensitized with previous DEA 1.1 positive transfusion [7].

Kangal dogs, the most imported dog breed from Turkey, is originate from the area around the Kangal District of Sivas Province in Central Turkey, from which it derives its name. The relative isolation of Sivas Province has kept the Kangal Dog free of crossbreeding for years and has resulted in a natural Turkish Breed [16]. For the last 3 decades, there has been a growing interest in the Kangal dogs due to their strength, loyalty, intelligence, endurance to extreme temperatures, and appropriateness as a livestock guardian dog. Moreover, these characteristics have made Kangal dogs more preferable for pet owners around the world such that Kangal breed clubs have been founded in U.S.A, England, Germany, Holland, France and Belgium since the 1950s [4, 23].

The prevalence of DEA 1.1 has been reported in several published papers in which distribution has been given as 51.3 [18], 66.7% [10], 44.6% [21], 47% [24], 36% [19], 52% [14], 43.3% [15] and 32% [17]. Breed effects on frequency of DEA 1.1 blood type were studied by several different research groups. WRIESENDORP et al. [25] reported 29%, 33% and 43% DEA 1.1 positive reactions in Retriever, Mongrel and Beagle dog breeds respectively. EJIMA et al. [5] reported prevalence for DEA 1.1 positive dogs as 82% for Mongrel dogs and 55% for Beagles in Japan. The highest incidences of DEA 1.1 positive dogs were reported from Croatia, in which the prevalence was reported as 96.7% in...
Materials and Methods

ANIMALS

A total of 198 Turkish Kangal Dogs were examined for blood typing. The purebred dogs surveyed were obtained from the following sources: (a) from Breeding and Research Centre for Kangal Dogs, established in 2005 at Cumhuriyet University, located at the city of Sivas in the Eastern Turkey; (b) from local government organizations and private breeders living around Kangal town of Sivas province.

SAMPLE COLLECTION

Blood samples (4 ml) were collected into tubes containing ethylenediaminetetraacetic-acid (EDTA) as an anti-coagulant. Samples were sent overnight on ice to Kirikkale University, located in the central region of Turkey, for blood typing. The samples were analyzed within 24 hours after transportation.

ANTISERA AND REAGENTS

Five types of polyclonal antisera, DEA 1.1, DEA 3, DEA 4, DEA 5 and DEA 7 were purchased from Midwest Animal Blood Services Inc. (Michigan, USA). At the time of our study, DEA 1.2 was not commercially available at anywhere including Midwest. Thus we could not run this group in the present study. Canine Coombs reagent was purchased from VMRD, Inc. (Pullman, USA). PBS tablets were obtained from Sigma.

SAMPLE ANALYSIS

Blood typing was performed in a tube agglutination assay as previously described by GIGER et al. [9] with some modification. In brief, samples were analyzed as presented under the following four subtitles.

PREPARATION OF RED BLOOD CELL SUSPENSIONS

EDTA-anticoagulated whole blood (0.5 ml) was mixed with 3 ml of PBS solution in a 12 x 75 mm glass tubes and centrifuged at 1000 g for 5 min. Thereafter, supernatant was discharged and remaining erythrocytes were re-suspended with phosphate-buffered solution (PBS) (3 ml) and then centrifuged for 5 min. The last step was repeated 3 times in total. Finally, the packed red cells were re-suspended in PBS to achieve an approximate 4% hematocrit.

RESULTS

The distribution of the blood types is presented in Table 2. Degree of agglutination was quantified as negative (0, no agglutination) and positive (1+, 2+, 3+ or 4+ grade reactions).
The present study estimates the frequency of blood types, DEA 1.1, 3, 4, 5 and 7, in Turkish Kangal dogs in their home country Turkey. There are quite variations among the reported frequencies of DEA 1.1. The lowest and highest type DEA 1.1 frequencies have been reported as 29% [25] and 96.7% [3], respectively. In the present study, frequency of DEA 1.1 positive dog was determined as 61.1%, which is twice as high as of the lowest result previously reported. The closest data reported to the present study were 66.7% [10] and 55% [5].

Breed effects on frequency of DEA 1.1 were studied by several different research groups. The prevalence of DEA 1.1 positive dogs was reported as 66.7% in Istrian Hounds, 90.0% in Croatian Sheepdogs and 96.7% in Dalmatians in Croatia [3]. WRIESENDORP et al. [25] reported 29%, 33% and 43% DEA 1.1 positive reactions in retriever, mongrel and beagle dog breed respectively. In another study carried out in Japan, the incidence was reported as 82% for Mongrel dogs and 55% for Beagles [5]. All these results indicate a significant breed effect on the distribution of DEA 1.1 blood type in dogs. In addition to this, the incidence for Mongrel dogs was reported as 33% [25], 48.7% [18] and 82% [5] in three different studies, also indicating a possible geographical effect on the distribution of DEA 1.1 blood type. The high incidence of the DEA 1.1 antigen positivity in Kangal dog population determined in the present study has a potential clinical importance from transfusion medicine point of view.

### References


