The prevalence of dog erythrocyte antigen 1 in relation to breed in the Daejeon area

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(Received 9 September 2016; revised 20 September 2016; accepted 20 September 2016)

Abstract

This study was performed to collect the basic data of DEA 1.1 in four small breed (Maltese, Shih-tzu, Poodle, Yorkshire terrier) and in three large breed (German shepherd, Labrador retriever and Jindo) dogs in the Daejeon area. 105 dogs from 7 breeds (Maltese=20, Shih-tzu=19, Poodle=15, Yorkshire terrier=11, German shepherd=10, Labrador retriever=10, Jindo=20) were selected and tested using the dog blood typing KitⓇ (Korea Animal Blood Bank Inc., South Korea). The prevalence of DEA 1.1 was 83%, that of DEA 1.2 was 17%, and there was no DEA (−) blood type identified in this study. Prevalence according to breeds was Maltese (DEA 1.1, 85%; DEA 1.2, 15%), Shih-tzu (DEA 1.1, 95%; DEA 1.2 5%), Yorkshire terrier (DEA 1.1, 91%; DEA 1.2, 9%), Labrador retriever (DEA 1.1, 90%; DEA 1.2, 10%). One hundred percent of DEA blood type 1.1 was discovered in all of the Poodles and German shepherds, and a higher prevalence of DEA 1.2 was found (DEA 1.1, 40%; DEA 1.2 60%) in Jindo dogs. The prevalence of DEA 1.2 in the Jindo dogs was significantly higher than in other breeds ($P<0.01$). German shepherds and Labrador retrievers may be more suitable as donor dogs than Jindo dogs in the Daejeon area. Larger scale studies are necessary from more dogs and other areas in South Korea.

Key words : Dog erythrocyte antigen (DEA), Prevalence, Donor, Dog

INTRODUCTION

The dog erythrocyte antigen (DEA) blood group system is the blood type found in dogs. The DEA system is comprised of 5 groups (DEA 1, 3, 4, 5, 7), and only DEA 1 has two phenotypes, which are DEA 1.1 and DEA 1.2. (Nelson and Couto, 2014; Hohenhaus, 2004; Cohen and Fuller, 1953). Among the DEA groups, DEA 1 is the most clinically important for blood transfusions due to its antigenic reaction (van der Merve et al, 2002).

A blood transfusion is necessary in several clinical situations, but dogs do not have natural antibodies against foreign blood (Swisher and Young, 1961).

Therefore, they can only have antibodies after a blood transfusion or after pregnancy, but some reports have revealed a lack of association between pregnancy and the development of antibodies in dogs (Nelson and Couto, 2014).

The first transfusion is not generally critical for recipients, so it can proceed without the identification of blood type and knowledge of a dog’s history of blood transfusions (Nelson and Couto, 2014). However, the probability of blood reacting may increase in the event of repeated transfusions. In the case of DEA 1, especially DEA 1.1, antibodies can cause complement activation and agglutination, resulting in hemolysis of targeted red blood cells (Giger et al, 1995). A second random transfusion would have a 15% possibility of a transfusion re-
action (Dudok de Wit et al., 1967). Therefore, knowledge of a dog’s history of blood transfusions and the identification of blood types is necessary. DEA 1.2 causes less hemolysis, and the reaction is not usually detectable (van der Merve et al., 2002).

Some reports have described the prevalence of DEA 1 and the frequencies of DEA blood types depending on breeds (Ejima et al., 1986; Symons and Bell, 1991; Hale et al., 2008). According to these papers, there were differences among breeds and countries. In some cases, even the same breeds have demonstrated a different prevalence of DEA 1.1. van der Merwe et al. (2002) reported that 23.6% of German shepherds had DEA type 1.1, Vanessa et al. (2011) reported that 10% of such dogs had DEA type 1.1, while Novais (1999) reported that 36.84% of German Shepherds had DEA type 1.1. These differences may be the result of geographical variations or the differences in the number of samples.

This study was performed to collect the basic data of blood type DEA 1 for canine blood transfusion in four small breed and three large breed dogs in the Daejeon area, South Korea.

MATERIALS AND METHODS

Sample collection

The populations of client-owned dogs were prospectively recruited at the Veterinary Clinics, between May 2015 and September 2015. A total of 105 samples from 7 breeds (Maltese=20, Shih-tzu=19, Poodle=15, Yorkshire terrier=11, German shepherd=10, Labrador retriever=10, Jindo=20) were examined and they were all vaccinated and selected randomly without knowledge of their histories of blood transfusions. Blood was taken from jugular or cephalic veins and contained EDTA. Owner consent was obtained prior to blood collection. Physical examination, complete blood count (CBC), serum biochemistry analyses were used to monitor the health of the dogs.

Blood typing

Collected samples were tested immediately using the dog blood typing kit® (Korea Animal Blood Bank Inc., Sokcho, South Korea). A drop of blood from a 1ml-syringe (26-gauge needle) was placed in each column. Each column had clear and transparent monoclonal antibodies that is against DEA 1.1, 1.2 and DEA 1(–). The column was mixed gently and blood typing proceeded after 2 minutes. The blood type of a sample was evaluated which column presented the agglutination. If a sample showed agglutination of Anti-1.1 column, the sample was recorded as DEA 1.1. A sample with vague agglutination of Anti-1.1 or 1.2 column was not included in this study. All procedures were performed according to the manufacturer's instructions (Korea Animal Blood Bank Inc., Sokcho, South Korea).

Statistical analyses

Statistical analyses were performed using SPSS for windows (version 19.0, IBM, NY, USA). The prevalence of DEA 1 was examined among breeds using a Chi-squared test.

RESULTS

The results of this study revealed that 83% of the samples were of blood type DEA 1.1, 17% of the samples were of blood type DEA 1.2, and 0% of the samples were of blood type DEA 1(–). There was no significant difference between male and female subjects.

For Maltese dogs, out of 20 sample subjects, 17 (85%) had DEA 1.1 and 3 (15%) had DEA 1.2. For Shih-tzus, out of 20 sample subjects, 19 (95%) were discovered to have DEA 1.1 and the other 1 (5%) had DEA 1.2. For Poodles, out of 15 sample subjects, all of them (100%) turned out to have DEA 1.1. For Yorkshire terriers, out of 11 sample subjects, 10 (91%) had DEA 1.1 and only the other one (9%) had DEA 1.2. For Labrador retrievers, out of 10 sample subjects, 9 (90%) had DEA 1.1, and the other one (10%) had DEA 1.2. For German shepherds, out of 10, all of them (100%)