



# Clinico haematological studies on xenotransfusion in cats\*

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## Abstract

*The present study was conducted in anaemic cats presented to the University Veterinary Hospital, Kakkalai and Teaching Veterinary Clinical Complex, Mannuthy. They were subjected to a detailed physical examination, blood smear and faecal sample examination and haematology to reach an etiological diagnosis and to assess the severity of anaemia. Xenotransfusion with dog blood was carried out in 10 severely anaemic cats. Clinical outcome and variation in haematological parameters before and 24 hours after the transfusion was evaluated.*

**Key words:** cat, anaemia, haematology, xenotransfusion

Anaemia is one of the major threats to the well-being of felines. The shorter life span of RBC and lower blood volume of cats compared to other species are considered to be the reasons that makes felines more susceptible (Tasker, 2012). Blood transfusion is practised routinely in critically ill cats to manage anaemia. Even though blood transfusion is advised in severe anaemic conditions, the timely blood transfusion to save the life of patient become impossible in several cases due to the difficulty in obtaining a suitable cat donor. The small quantity of blood obtained and difficulty to collect blood from donor cats are the major limiting factors in cat to cat blood transfusions. Transfusion of blood from a species to a different species, called xenotransfusion, has been tried in different species. In emergency situations, xenotransfusion has been advocated in cats. Dog blood is suggested for this purpose in cats due to the absence of alloantibody formation against dog erythrocytes (Kisielewicz and Self, 2014).

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## Materials and methods

The study was conducted in 10 anaemic cats presented to the small animal medicine unit of University Veterinary Hospital, Kokkalai and Teaching Veterinary Clinical Complex, Mannuthy. Six apparently healthy animals were kept as control group. Cats were screened for anaemia by clinical and haematological parameters as well as by blood smear examination and faecal sample examination. Major and minor cross matching was performed to test the compatibility. Anaemic cats were transfused with blood from apparently healthy dogs on informed consent. Blood was collected into one or more multiple syringes containing anticoagulant citrate-phosphate-dextrose-adenine-1 (Fig 1 & 2).



Fig 1. Blood collection from healthy dog



Fig 2. Xenotransfusion into an anaemic cat

The amount of blood drawn was calculated using the formula,

Volume of whole blood required (mL) = Desired increase in PCV (%) × body weight (kg) × 2 (Griot-Wenk and Giger, 1995).

Clinical outcome and the variations in blood parameters before and 24 hours after the transfusion were evaluated. A complete blood count was recorded using ORPHEE Mythic 18 Vet CBC Machine.

## Results and discussion

Major clinical signs and physical examination findings in anaemic cats were anorexia, pallor of mucous membrane, weakness and lethargy. Pallor of mucous membrane and reduced growth rates were considered as the primary signs of anaemia in animals (Day and Kohn, 2012). Infection with *Mycoplasma* spp and gastrointestinal parasites *Ancylostoma* spp and *Toxocara* spp were the etiological agents that led to severe anaemia in cats in the present study. Tasker (2010) reported that one of the major reasons for severe anaemia in cats was infection with *Mycoplasma* spp identified through blood smear examination. According to Parsons (1987), *Toxocara cati* and *Ancylostoma tubaeforme* were the two most commonly reported gastrointestinal parasites of cats causing anaemia.

Comparison of vital parameters including heart rate, respiratory rate and rectal temperature did not show significant difference after xenotransfusion with canine blood. Comparison of vital parameters of apparently healthy animals and anaemic cats before and after xenotransfusion are given in table 1.

The mean ± SE values of haemoglobin level for control animals was 10.16±0.29 g/dL. The level was decreased in anaemic cats (2.96±0.34 g/dL) when compared to control animals. In post xenotransfused animals, statistically significant ( $p \leq 0.01$ ) increase was noticed in the mean values of haemoglobin level when compared to anaemic animals. Rajnat *et al.* (2017) observed a similar finding in which haemoglobin level of an anaemic cat increased after 24 hours of transfusion with

**Table 1.** Respiratory rate, heart rate and rectal temperature of apparently healthy animals and anaemic cats

Parameter	Healthy animals (n=6)	Anaemic cats			
		Before xenotransfusion (n=10)	p-value	After xenotransfusion (n=10)	p-value
Respiratory rate (per minute)	24.50±1.99	23.70±3.84 <sup>ns</sup>	0.800	23.40±2.71 <sup>ns</sup>	0.819
Heart rate (per minute)	132.33±2.49	128.70±3.78 <sup>ns</sup>	0.504	131.70±4.03 <sup>ns</sup>	0.295
Rectal temperature (° F)	100.91±0.08	101.46±0.44 <sup>ns</sup>	0.369	102.08±0.25 <sup>ns</sup>	0.080

ns- no significant difference at 0.05

**Table 2.** Haemogram results of healthy, pre-xenotransfused and post xenotransfused cats.

Parameter	Healthy animals (n=6)	Before xenotransfusion (n=10)	p-value	After xenotransfusion (n=10)	p-value
Haemoglobin (g/dL)	10.16±0.29	2.96±0.34**	0.000	5.60±0.35**	0.000
PCV (%)	31.26±1.16	11.38±0.80**	0.000	19.51±0.89**	0.000
TEC ( $\times 10^6/\mu\text{L}$ )	6.35±0.39	2.15±0.25**	0.000	3.34±0.23**	0.001
TLC ( $\times 10^3/\mu\text{L}$ )	10.43±1.48	14.63±2.85 <sup>ns</sup>	0.215	16.99±2.96 <sup>ns</sup>	0.177
Platelet Count ( $\times 10^3/\mu\text{L}$ )	264.83±32.37	92.90±20.44**	0.002	135±18.55**	0.002
Granulocyte count (%)	62.90±1.56	47.60±5.59*	0.024	53.95±7.85 <sup>ns</sup>	0.447
Monocyte count (%)	2.80±0.24	5.13±0.96*	0.041	5.26±0.83 <sup>ns</sup>	0.910
Lymphocyte count (%)	34.30±1.51	46.76±6.28 <sup>ns</sup>	0.083	40.79±8.29 <sup>ns</sup>	0.494
MCV ( $\mu\text{m}^3$ )	49.93±2.82	57.05±5.26 <sup>ns</sup>	0.341	60.86±4.78 <sup>ns</sup>	0.075
MCH (pg)	16.23±0.85	14.99±0.98 <sup>ns</sup>	0.403	17.28±1.25 <sup>ns</sup>	0.088
MCHC (g/dL)	32.56±0.81	25.06±2.29**	0.010	28.87±1.78 <sup>ns</sup>	0.141

\*- significant at  $p < 0.05$  and \*\*-significant at  $p < 0.01$ , ns: no significant difference at 0.05

canine whole blood. Mean packed cell volume (PCV) of healthy animals was 31.26±1.16 per cent. In anaemic cats, mean values of PCV were significantly lower in comparison to normal healthy animals (11.38±0.80 per cent). A significant increase was noticed in the PCV after xenotransfusion compared to anaemic cats (19.51±0.89 per cent). Weingram *et al.* (2014) recorded that PCV of an anaemic kitten increased to 23 per cent from 13 per cent, 24 h after xenotransfusion. Estimated mean values of total erythrocyte counts of control animals and anaemic cats were 6.35±0.39 and 2.15±0.25  $\times 10^6/\mu\text{L}$  respectively. A significant decrease was noticed in total erythrocyte count of anaemic cats when compared to healthy animals. After xenotransfusion, mean values

(3.34±0.23  $\times 10^6/\mu\text{L}$ ) showed a significant increase compared to pre-xenotransfusion values. Compared to healthy animals, anaemic cats showed a significant decrease in total thrombocyte count. The mean total thrombocyte count values of healthy and anaemic animals were 264±26.83  $\times 10^3/\mu\text{L}$  and 92.90±20.44  $\times 10^3/\mu\text{L}$  respectively. Corresponding post xenotransfusion value of mean thrombocyte count was 135.60±18.55  $\times 10^3/\mu\text{L}$  and a significant increase was noticed in the mean thrombocyte value after xenotransfusion

Other haematological parameters analysed include total leucocyte count, differential leucocyte count, mean corpuscular volume, mean corpuscular haemoglobin and

mean corpuscular haemoglobin concentration. Compared to anaemic animals, variation in these parameters were not statistically significant. The mean  $\pm$  SE values of healthy, pre-xenotransfused and post xenotransfused cats are as in table 2.

In the present study, a significant clinical improvement was noticed in anaemic animals after transfusing with dog blood. It was evidenced by the animal becoming active and improvement shown in appetite. Weakness of the animal reduced on second day after transfusion with dog blood and animal started to take food and water (Weingram *et al.*, 2014).

In the current study, anaemic cats had a considerable improvement in haemoglobin level, PCV, total erythrocyte count and total thrombocyte count. A significant increase was noticed in all these four haematological parameters compared to pre-xenotransfusion values.

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