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Therapeutic alternations of haematological parameters in canine parvo virus

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Abstract

A total 64 numbers of dogs (36 male and 28 female) were divided age wise into three age groups *viz.* group A (1-3 months), group B (4-12 months) and group C (more than 12 months) with 24, 26 and 14 animals in the said age groups respectively and sex wise into exotic (52 animals) and indigenous breeds (12 animals) to study the therapeutic alternations of haematological parameters and electrolyte concentration in Canine Parvo Virus infection after treatment with conventional method and conventional with administration of hyperimmune sera. Further, the exotic group included small (10 animals), medium (6 animals) and large (36 animals) sized dogs. The Hb % of both exotic and indigenous breeds irrespective of the size did not differ significantly after treatment with conventional method. No variations were observed in PCV, MCV, MCHC and MCH values among and within the breeds of dogs after conventional method of treatment. Similarly, no variations were found in the values of Neutrophil, Eosinophil and Monocyte among different age groups of dogs after treatment with conventional method with administration of hyperimmune sera. No variations were observed in TLC value, N%, L%, E% and M% values in male and female dogs after treatment with conventional method.

Keywords: Alteration, canine parvo virus, haematology, therapeutic

Introduction

The Canine parvovirus infection (CPV) has become an important problem in dog population worldwide as it causes severe haemorrhagic gastroenteritis which may rapidly spreads in domestic dog populations as well as wild dogs with high morbidity (100%) and frequent mortality up to 10% [1] in treated dogs. Canine parvovirus enteritis is an acute, fatal and contagious gastrointestinal infection usually occur in unvaccinated puppies between 6 to 20 weeks old. Symptoms in puppies over two months include vomiting, anorexia, nausea, haemorrhagic gastro enteritis, bloody diarrhoea with foul smell, leukopenia and myocarditis and also result in the disease exhibiting high morbidity (100%) and low mortality [9,10] in treated puppies. The highest occurrence of CPV was during in summer followed by rainy season and winter also observed that the sexually intact dogs were at four times greater risk than spayed or neutered dogs and intact males were twice as likely as intact females in CPV enteritis [2,7]. Factors that predispose parvovirus infection in puppies are lack of protective immunity, overcrowding of animals in a small space, unhygienic, stressful environmental conditions [5,8]. In neonatal animals, the virus replicates mitotically and FPV usually results in cerebellar hypoplasia, whereas myocarditis is caused by CPV. The viral replication is limited to lymphoid and small intestinal cells causing temporary panleukopenia or lymphopenia in older animals. Virus has strong affinity for intestine, bone marrow, lymph nodes and invades to mitotic cells, after an incubation period of 7-14 days causing intestinal impairment [6]. Invasion of the bone marrow causes a decrease in the white blood cell count leading to increased susceptibility to bacterial infections and endotoxemia [4]. The present study revealed the therapeutic alterations of haematological parameters in canine parvo virus infections.

Materials and Methods

A total 64 numbers of dogs (36 male and 28 female) were divided into three age groups *viz.* group A (1-3 months), group B (4-12 months) and group C (more than 12 months) with 24, 26 and 14 animals in the said age groups respectively. Further, the above animals were divided into exotic (52 animals) and indigenous breeds (12 animals). The exotic group included small (10 animals), medium (6 animals) and large (36 animals) sized dogs. The blood samples were collected from the dogs treated both by conventional method and hyper immune sera before

and after the treatment schedule and analysed for Haemoglobin (Hb), Total Leucocyte Count (TLC), Different Leucocyte Count (DC), Total Erythrocyte Count (TEC), Packed Cell Volume (PCV), MCV, MCHC and MCH were made as per standard method [3].

Results and Discussion

Haematological study in conventional method of treatment

The exotic breeds like, German Spitz, Cocker spaniel, Chihuahua, Pug, Boxer, Beagle, Bulldog German Shepherd, Labrador Retriever, Great Dane, Golden Retriever, Rottweiler, Doberman, Dalmatian, Neapolitan Mastiff were presented for the study and the breeds were categorised into small, medium, large varieties depending upon the size. Where as in case of indigenous breed no separation was done. The Hb% of exotic breeds ranged from 10.36gm/dl to 11.00gm/dl with an average of 10.49gm/dl and indigenous have 10.80gm/dl without having any significant difference among the breed, i.e. it decreased during the infection, which was similar to the findings of Zafar *et al.* [11]. After traditional therapy there was improvement of Hb observed which ranged from 11.52 gm/dl to 12.08gm/dl in exotic and 11.40gm/dl in case of indigenous. Though there was increased of Hb% in post treatment, but was not significantly difference with the pre-treatment.

The average TLC of the 3 categories of dogs in exotic breed was 11153.85 ($10^3/\mu\text{l}$) and in indigenous 13466.67 ($10^3/\mu\text{l}$) in before treatment and after treatment it was increased to 11592.17 ($10^3/\mu\text{l}$) and 15400 ($10^3/\mu\text{l}$) respectively. Similarly, the N% in the blood was 61.19% and 62.50% before treatment in exotic and indigenous breed respectively which was increased to 63.74% and 69.50%. There was significant difference ($P < 0.05$) of the N% of exotic and indigenous dogs after treatment (63.74% vs 69.50%). No significant variation of Lymphocyte, Eosinophil and Monocyte were observed before and after treatment of both the breed. However exotic dogs have significant higher ($P < 0.05$) lymphocyte and lower monocyte than indigenous dog. Before treatment no difference of TEC was seen among the breed but after treatment indigenous dogs have higher TEC than exotic ($6.2010^6/\mu\text{l}$ vs $4.8510^6/\mu\text{l}$).

PCV, MCV, MCHC and MCH were estimated at the beginning of the treatment and compared with the post therapeutic period and observed no significant variation among the breed and within the breed. No significant variation of Hb% was observed with the advancement of age in both exotic and indigenous breed. But most of the cases non-significant increase of the Hb% level in the blood was seen after the treatment. The TLC level did not vary among the different age group of the dogs at pre therapeutic period, but after traditional therapy indigenous dogs have higher TLC level than the exotic dogs at 1-3 months and 4-12 months of age. Above 12 months of age the N% of the indigenous dog showed higher value than the exotic dog at pre-treatment period where as in post treatment period between 4-12 months of age indigenous dogs have higher N % than the exotic dog. In case of Lymphocytes no variation was found among the different age group in before treatment but after treatment 1-3 months and 4-12 months of age of exotic have higher Lymphocyte count than the indigenous. No variation of Eosinophil %, Monocyte % of the dogs was seen in different age groups of the two breeds.

The TEC of indigenous dog was $6.6010^6/\mu\text{l}$ at 4-12 months of

age where in exotic it was $4.2010^6/\mu\text{l}$, which was significantly higher at post therapy period. No such variation of TEC was seen in pre-treatment period. The PCV and MCV value of the exotic dog at 4-12 months of age was significantly higher than the indigenous dog at post therapeutic period, but no difference was observed at different age group at the beginning of the treatment. The MCHC value of the dogs was not changed with the therapeutic regimens of both the breeds and all age groups of the dogs. The MCH value of the exotic was 31.04pg at 12 months of age in post therapeutic period where as in indigenous it was 14.84pg at the same age group. After therapeutic treatment both male and female have significant improved in Hb% in blood but no variations were seen between the sexes. Similarly, no variations were also found in TLC in male and female dogs. N%, L%, E%, M% does not have significant variation in male and female. The PCV of the exotic female was higher than the male dogs at both pre and post treatment period. The TEC also did not affect by the sex in both the breeds of the dogs.

The MCV values of the female exotic dog was significantly higher ($P < 0.05$) at both pre and post treatment period where as the MCHC value in male was significantly higher than its female counterpart at post therapeutic period. No variation of MCH value of the blood was observed in both the sex of the breed.

Haematological study in conventional method of treatment with administration of hyperimmune sera

The effect of administration of hyper immune serum on the haematological parameters in the two breeds of the dogs were assessed before and after treatment. The exotic breeds have a different body size and classified in to 3 categorised i.e. small medium and large and compared with the indigenous breed. The Hb % of both exotic and indigenous irrespective of the size increased with administration of Hyper immune serum in comparison to pre-treatment status, but not significantly different. Similarly, the TLC was also increased with respect to pre-treatment period and did not show any variation neither among the breed nor among the size. The overall Neutrophil % of the exotic breed was 63.69% and 64.33% before and after treatment and in indigenous was 67.33% and 63.00% respectively during the corresponding period. No variation was observed in the Neutrophil, Lymphocyte, Eosinophil of the breeds before and after treatment.

TEC of the exotic breed ranged from $3.6310^6/\mu\text{l}$ to $5.6610^6/\mu\text{l}$ in different categories of exotic breed with an average of $5.1610^6/\mu\text{l}$ at the start of the treatment and after post treatment the average fig was $4.7710^6/\mu\text{l}$ which is not different with respect to pre-treatment period. Similarly, in case of indigenous the TEC value was $3.9010^6/\mu\text{l}$ to $5.2110^6/\mu\text{l}$ in dogs during the therapeutic regimens. The MCV, MCHC and MCH values of the blood also didn't vary among the breeds and sizes whereas the PCV values were significantly higher ($P < 0.05$) during post treatment period of the indigenous dog (36% vs 27.5%). There is a large variation of age group of the 32 number of presented dogs, those were categorised in to 3 group depending upon the age to study the effect of hyper immune serum injection on the CPV affected dogs. Most of the haematological parameters didn't show any variation between the two breed of the dogs and also with the age of the dogs. TLC of 4 to 12 months of age in exotic breed was significantly higher ($P < 0.05$) than the indigenous dog. Similarly, the lymphocyte of the exotic dogs was 30% at 4 to 12 months of age where as in case of indigenous it was

significantly lower with a value of 24.33%. No other DC parameters like Neutrophil, Eosinophil and Monocyte were differ among the age groups of the dog.

The TEC values of the dog before treatment was in a range of $4.8310^6/\mu\text{l}$ to $5.6010^6/\mu\text{l}$ in both indigenous and exotic dog during before treatment period and after post treatment, the value range from $3.7010^6/\mu\text{l}$ to $5.2510^6/\mu\text{l}$ in different age group of the dogs. The PCV, MCV, MCHC and MCH values of the dog did not differ with the age and between the exotic and indigenous breed. No significant variations of the Hb% of the male and female dogs were observed neither in in exotic nor in indigenous dogs. The Hb% of the female dogs of both the breed increased during the post therapeutic period. TLC of male dogs of both the breed ranged from $10663.3310^3/\mu\text{l}$ to $12575.0010^3/\mu\text{l}$ and in the female, it was with a range of $12733.33 10^3/\mu\text{l}$ to $13900.00 10^3/\mu\text{l}$ during pre-treatment period and in post treatment the values were $122021.4310^3/\mu\text{l}$ to $1300010^3/\mu\text{l}$ in male and $10000 10^3/\mu\text{l}$ to $1320010^3/\mu\text{l}$ in female dogs respectively which was not significantly difference among the sex. Neutrophil, Lymphocyte, eosinophil and monocyte % values of the blood also did not vary among breed and also with the sex.

The PCV was increased with post therapeutic in female exotic dogs from 29.40% to 33.30%, where as in indigenous it was also increased 28.67% to 34%. No variation was also observed between the breed of both the sex. The TEC of the exotic dogs ranged from $5.0810^6/\mu\text{l}$ to $5.2810^6/\mu\text{l}$ and in indigenous $4.82 10^6/\mu\text{l}$ to $5.60 10^6/\mu\text{l}$ before treatment which also did not differ with the sex. The MCV, MCHC and MCH values also were with the normal range and denote vary neither among the breed nor with the sex.

Conclusion

No significant variations in most of the haematological parameters such as Hb (%), TLC, TEC, neutrophil, eosinophil, lymphocyte, monocyte was observed between the exotic and indigenous breeds of dogs in both the methods of treatments of CPV infected dogs. However, Hb% in blood increased in both the sexes after treatment with conventional method. Similarly, the PCV value increased in both indigenous and exotic breeds of dogs after treatment with conventional method along with administration of hyperimmune sera.

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