



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2025; SP-9(2): 88-90
www.biochemjournal.com
 Received: 09-11-2024
 Accepted: 13-12-2024

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Molecular epidemiology of canine parvovirus infection in dogs in Jabalpur (M.P.)

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DOI: <https://doi.org/10.33545/26174693.2025.v9.i2Sb.3695>

Abstract

A total of 319 dogs with gastroenteritis were examined during a period of 06 months i.e., from May to October 2024. Parvovirus infection was suspected in 118 dogs with haemorrhagic gastroenteritis. Out of 118 suspected cases, 57 were found to have parvovirus infection, confirmed through PCR. Age, sex, breed, deworming, vaccination status and duration of illness of each dog were recorded to study the occurrence of canine parvovirus. The overall occurrence of haemorrhagic gastroenteritis in dogs with gastroenteritis was 36.99% (118/319) and the occurrence of parvovirus infection amongst haemorrhagic gastroenteritis cases in dogs was 48.30% (57/118). Dogs between 0-3 months of age showed the highest occurrence (67.50%) followed by 3-6 months of age (51.72%) and 6-12 months of age (40%), whereas, the lowest prevalence of canine parvovirus was reported in the dogs above 12 months of age (20.83%). The maximum occurrence was noticed in non descript dogs i.e. (61.36%) followed by German shepherd (56.25%), Labrador Retriever (36%), Beagle (28.57%), Rottweiler (16.66%) and Pug (nil). The sex wise occurrence revealed higher occurrence in males (59.21%) as compared to females (28.57%). The occurrence was higher in not dewormed 50.88% and non vaccinated dogs (59.65%) and in dogs who showed duration of illness for 1-2 days (42.10%).

Keywords: Canine parvovirus (CPV), PCR, epidemiology, gastroenteritis

Introduction

Canine parvovirus (CPV) infection occurs worldwide in domestic and wild canids and is a highly infectious and contagious fatal viral disease. This infection is caused by canine parvovirus, the smallest single stranded DNA virus, infects rapidly dividing cells of the gastrointestinal tract, bone marrow, lymphoid tissue and cardiac myocytes (Tuteja *et al.*, 2022) [19]. The disease is characterised by inappetence progressing to anorexia, lethargy, vomiting, bloody diarrhoea and dehydration (Panda *et al.*, 2009) [13]. The disease condition has been complicated further due to the emergence of several variants, namely CPV-2a, CPV-2b and CPV-2c over the years (Buonavoglia *et al.*, 2001) [5]. Several factors predispose canines to parvoviral infection, such as early weaning, lack of protective immunity, overcrowding, abrupt diet change, lack of deworming and vaccination, malnourishment, unhygienic environment and intestinal parasites (Hong *et al.*, 2007 and Sagar *et al.*, 2008) [9, 15]. This study investigates the occurrence of parvovirus infection in dogs within the Jabalpur region of Madhya Pradesh.

Materials and Methods

The study was conducted on 319 dogs suffering from gastroenteritis from May to October 2024 at the College of Veterinary Science and Animal Husbandry Jabalpur. PCR was carried out on 118 dogs faecal samples to confirm canine parvovirus infection. The age, sex, breed, deworming and vaccination status and duration of illness of each dog were recorded to study the occurrence of canine parvovirus.

Results and Discussion

The overall occurrence of haemorrhagic gastroenteritis in dogs with gastroenteritis was 36.99% (118/319) and the occurrence of parvovirus infection amongst haemorrhagic gastroenteritis cases in dogs was 48.30% (57/118).

Similar findings were noted by (Kataria *et al.*, 2020 and Panchsheel *et al.*, 2024) [10, 12] who found similar higher occurrence of 59.61% and 56.43% respectively. The variation in the occurrence of CPV might be attributed to the differences in diagnostic tests, sample sizes, study durations, and geographical locations (Khare *et al.*, 2020) [11]. However, the current study reveals notably high parvovirus infection among dogs at VCC, Jabalpur, likely due to incomplete vaccination and compromised immune systems.

Age wise occurrence of parvovirus infection in dogs

Dogs between 0-3 months of age showed the significantly higher occurrence (67.50%) followed by 3-6 months of age (51.72%) and 6-12 months of age (40%). Whereas, the lowest prevalence of canine parvovirus was reported in the dogs above 12 months of age (20.83%). These observations aligned with those of (Surendhar *et al.*, 2018, Desai *et al.*, 2020) [18, 8] who reported the highest occurrence in dogs of age group 0-3 months i.e., 47.37% and 41.26% respectively. The young dogs 0-3 months of age were found to be more susceptible to the infection which could be due to the virus's affinity for rapidly dividing intestinal cells, which decline with the advancement of age (Banja *et al.*, 2003) [3].

Table 1: Age wise occurrence of parvovirus infection in dogs

Age group (months)	No. of dogs suspected	No. affected	Occurrence (%)
0-3	40	27	67.50
3-6	29	15	51.72
6-12	25	10	40.00
Above 12	24	05	20.83

Pearson Chi-square value =13.982, DF=3, P-Value=0.003

Breed wise occurrence of canine parvovirus infection

The present study investigated CPV infection in a diverse range of dog breeds, including Labrador Retriever, German Shepherd, Beagle, Rottweiler, Pug and non descript dogs. Significantly, higher occurrence of parvovirus infection was encountered in non descript breed i.e., 61.36% (27/57) followed by German Shepherd i.e., 56.25% (18/32), Labrador Retriever i.e., 36.00% (09/25), Beagle i.e., 28.57% (02/07) and Rottweiler i.e., 16.66% (01/06) while, occurrence for parvovirus infection was nil among Pug.

Higher occurrence in non descript dogs was also documented by (Shukla *et al.*, 2010 and Behera *et al.*, 2015) [16, 4] which was (56.90%) and (34.48%) while, (Singh *et al.*, 2013 and Reddy *et al.*, 2015) [17, 14] reported highest occurrence of CPV in Doberman (77.78%) and Spitz (43.75%) respectively. Non descript dogs showed the highest occurrence of CPV infection which might be attributed to lack of vaccination and many of them were stray so they tend to wander around and even enter hospital premises, where they can easily contract an infection. German shepherd dogs were at second position in occurrence which could be because they are the most reared breed in this region, because of their natural guarding instincts, versatility and athleticism. Comparatively, reduced occurrence of the disease in other breeds like Labrador, Beagle, Spitz and Pug might be due to appropriate vaccination schedules being followed.

Table 2: Breed wise occurrence of parvovirus infection in dogs

Breeds	No. suspected (n=118)	No. affected (n=57)	Occurrence (%)
Non descript	44	27	61.36
German Shepherd	32	18	56.25
Labrador Retriever	25	09	36.00
Beagle	07	02	28.57
Rottweiler	06	01	16.66
Pug	04	00	00

Pearson Chi-square value = 12.564, DF=5, P-Value=0.028

Sex wise occurrence of canine parvovirus infection

The sex wise occurrence revealed significantly higher occurrence in males (59.21%) compared to females (28.57%). These findings supported by (Anuja 2024) [2] whose findings depicted an increased occurrence of parvovirus infection among male dogs i.e., (71.64%). Alternatively, (Chethan *et al.*, 2023) [6] reported a significantly higher prevalence in females than males. Male dogs were found to be more susceptible to the infection which could be due to pet owner's preferential choice for owing males as pets because of their appealing behaviour for certain roles such as guarding, breeding purposes (as they can sire multiple litters), lack of heat cycles and neutering concerns and overall convenience and profitability make them more likely to be exposed to CPV infection (Deka *et al.*, 2013) [7].

Table 3: Sex wise occurrence of parvovirus infection in dogs

Gender	No. of dogs suspected	No. affected	Occurrence (%)
Male	76	45	59.21
Female	42	12	28.57

Pearson Chi-square value = 10.169, DF=1, P-Value=0.001

Deworming status in dogs affected with parvovirus infection

The occurrence was higher in not dewormed dogs, 50.88% (29/57), followed by irregularly dewormed dogs, 28.07% (16/57). Severe parasitic burden compromises the immune system, induce stress and alter gut microbiota, thereby predisposes dogs to opportunistic infections like parvovirus.

Table 4: Deworming status in dogs affected with parvovirus infection

Deworming status	No. affected (n=57)	Percent (%)
Regular and proper deworming	12	21.05
Irregular deworming	16	28.07
No deworming	29	50.88

Vaccination status in dogs affected with parvovirus infection

The occurrence was higher in unvaccinated dogs 59.65% (34/57), followed by irregularly vaccinated dogs, 31.58% (18/57). The higher occurrence of CPV infection in unvaccinated dogs could be due to a lack of protective immunity (Alves *et al.*, 2020) [1]. However, CPV infection might occur in vaccinated dogs, due to incomplete vaccination course or vaccine failure as a result of vaccinating a diseased or immunocompromised animal, failure to maintain cold chain or incorrect vaccine administration (wrong route, dose or timing).

Table 5: Vaccination status in dogs affected with parvovirus infection

Vaccination status	No. affected (n=57)	Percent (%)
Regular and proper vaccination	05	08.77
Irregular vaccination	18	31.58
No vaccination	34	59.65

Duration of illness in dogs affected with parvovirus infection

The higher occurrence of CPV infection i.e., 42.10% (24/57) was reported in dogs who showed history of illness for 1-2 days. The higher occurrence of CPV infection in dogs who showed the history of illness for 1-2 days is possibly linked to reporting bias, as owners often overlook initial symptoms, expecting them to subside in a few days, leading to delayed reporting in hospital.

Table 6: Duration of illness in dogs affected with parvovirus infection

Particulars	Category (days)	No. affected (n=57)	Percent (%)
Duration of illness	0-1	15	26.31
	1-2	24	42.10
	2-3	18	31.57

Conclusion

In the present study, the overall occurrence of haemorrhagic gastroenteritis in dogs with gastroenteritis was 36.99% and the occurrence of parvovirus infection amongst haemorrhagic gastroenteritis cases in dogs was 48.30% at VCC, Jabalpur during the period from May to October 2024 was 36.99%. Age wise occurrence was found to be maximum (67.50%) in dogs up to 0-3 months, highest occurrence was observed in non descript dogs (61.36%), whereas sex wise occurrence was higher in males (59.21%) than females.

Acknowledgement

The authors acknowledge the support of the Dean, College of Veterinary Science and Animal Husbandry, Jabalpur, who provided the necessary resources and facilities for this research project.

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