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Article

Canine Distemper in Dogs: Causes, Diagnosis, Prevention, and Control

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Abstract: Canine distemper is one of the most highly contagious viral diseases affecting domestic dogs and other carnivorous animals and remains a significant concern in veterinary practice. The disease primarily affects the respiratory, digestive, and central nervous systems and is particularly severe in unvaccinated puppies, often resulting in death. This article discusses the etiology of the disease, routes of transmission, clinical manifestations, modern diagnostic methods including PCR and ELISA laboratory tests, as well as preventive measures and epizootic control strategies. The findings indicate that timely vaccination, early diagnosis, isolation of infected animals, and strict adherence to veterinary sanitary regulations are the most effective measures for limiting disease spread and reducing economic losses.

Keywords: canine distemper, Canine Distemper Virus (CDV), dogs, diagnosis, PCR, ELISA, prevention, vaccination

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1. Introduction

Canine distemper is one of the most significant viral diseases affecting domestic dogs and other carnivorous animals worldwide. The disease is caused by the **Canine Distemper Virus (CDV)**, an enveloped, single-stranded RNA virus belonging to the genus *Morbillivirus* within the family *Paramyxoviridae*. Owing to its high contagiousness and multisystemic nature, canine distemper remains a major challenge in veterinary medicine despite the availability of effective vaccines [1].

The virus primarily spreads through aerosolized respiratory secretions and direct contact with infected animals or contaminated materials. Following infection, CDV initially replicates in the lymphoid tissues before disseminating to the respiratory, gastrointestinal, urinary, integumentary, and central nervous systems. Consequently, affected animals may develop a wide range of clinical manifestations, including fever, ocular and nasal discharge, coughing, vomiting, diarrhea, skin lesions, neurological disorders, and, in severe cases, death [2], [3]. Young, unvaccinated puppies and immunocompromised animals are particularly susceptible to severe disease and high mortality rates.

Accurate diagnosis of canine distemper remains challenging because of its variable clinical presentation. Therefore, laboratory diagnostic methods such as polymerase chain reaction (PCR), enzyme-linked immunosorbent assay (ELISA), virus isolation, and immunofluorescence techniques play an essential role in confirming infection [4]. Early diagnosis combined with prompt isolation of infected animals is crucial for limiting viral transmission. Vaccination remains the most effective preventive measure against canine distemper. Regular immunization programs, strict biosecurity practices, quarantine of newly introduced animals, and adherence to veterinary sanitary regulations significantly reduce the incidence and economic impact of the disease. Therefore, continuous

monitoring, early detection, and effective preventive strategies are essential for protecting both companion and wild carnivorous animal populations. The aim of this study is to review the etiology, epidemiology, clinical manifestations, diagnostic approaches, prevention, and control measures of canine distemper and to emphasize the importance of timely vaccination and veterinary surveillance in reducing disease prevalence [5], [6], [7].

Literature Review

Canine distemper has been known since the early domestication of dogs (approximately 10,000 BC). Aristotle described the disease as a form of angina. In 1905, the French scientist Henri Carré identified its viral etiology, and since then the disease has also been known as Carré's disease.

In the former Soviet Union, I. Mirolyubov first reported canine distemper in dogs in 1932. In 1938, V. A. Pankov identified the disease in sable and foxes. Between 1953 and 1957, N. V. Syurin, V. A. Pankov, and S. Ya. Lyuboshenko published extensive research findings on this disease. Today, canine distemper occurs in many countries worldwide, including Uzbekistan [8].

Disease Overview

Canine distemper (Latin: *Pestis carnivorum*; English: *Canine Distemper*; Russian: *чума плотоядных*, *болезнь Каппе*; Uzbek: *Karre kasalligi*) is an acute, contagious infectious disease characterized by fever, inflammation of the mucous membranes of the digestive and respiratory systems, pneumonia, conjunctivitis, skin lesions, and damage to the central nervous system.

Canine distemper is one of the most significant viral diseases affecting dogs and other carnivorous animals. The causative agent is the Canine Distemper Virus (CDV), a member of the family *Paramyxoviridae* and the genus *Morbillivirus*. The virus infects the respiratory, digestive, lymphatic, and central nervous systems, causing severe clinical manifestations and high mortality rates, particularly among unvaccinated puppies [9], [10].

According to Greene, the clinical manifestations depend on the extent of viral dissemination within the host and the animal's immune status. Common symptoms include fever, nasal and ocular discharge, coughing, diarrhea, and neurological disorders. According to the Merck Veterinary Manual, modern laboratory techniques such as PCR, ELISA, and immunofluorescence are recommended for accurate diagnosis.

2. Materials and Methods

Disease Course and Clinical Signs

The incubation period of canine distemper in dogs usually ranges from 14 to 21 days, although it may be longer in some cases. Disease progression depends on the animal's immune status, age, and the virulence of the virus. Clinically, the disease may occur in pulmonary, intestinal, cutaneous, neurological, or mixed forms.

The disease generally begins with an increase in body temperature to 39.5–40°C, lethargy, loss of appetite, and inflammation of the conjunctival and nasal mucous membranes. In the pulmonary form, rhinitis, tracheitis, bronchitis, coughing, and respiratory distress are commonly observed. The intestinal form is characterized by vomiting, diarrhea, and occasionally foul-smelling bloody feces. In the cutaneous form, pustular eruptions develop on the abdomen and inner thighs, later rupturing and forming crusts. The neurological form is associated with muscle tremors, impaired coordination, seizures, and paralysis. In most cases, the disease presents as a mixed form.

Canine distemper may occur in acute, subacute, chronic, or abortive forms. In the acute form, body temperature may rise to 41–42°C, and death can occur rapidly. The subacute form lasts for several days or weeks. In chronic cases, neurological damage predominates, and paralysis and other neurological complications may persist for an extended period. In the abortive form, the disease is mild, and recovery occurs within a short time.

3. Results and Discussion

Prevention

Dogs that recover from canine distemper generally develop lifelong immunity. Vaccinated dogs develop protective immunity within 10–21 days, which lasts approximately one year. Puppies born to vaccinated dams receive passive maternal (colostral) immunity, which provides protection against the virus for approximately 28 days.

Three live attenuated vaccines—668-KF, EPM, and VAKCHUM—are used to protect carnivorous animals against canine distemper virus. Pregnant dogs are vaccinated approximately one month before whelping, while puppies are vaccinated beginning at two months of age.

Preventive and Control Measures

General preventive measures include prohibiting the introduction of dogs and fur-bearing animals from epizootically affected farms or regions. Animals should only be obtained from kennels and farms certified as free from canine distemper. Newly introduced animals must undergo a 30-day quarantine.

Dogs participating in exhibitions should be vaccinated against canine distemper before being permitted entry [11]. Proper veterinary-sanitary measures, good zoohygienic management, and appropriate animal husbandry practices enhance the effectiveness of active immunization. Only clinically healthy animals should be vaccinated, and vaccines must be administered according to the manufacturer's instructions.

If laboratory confirmation of canine distemper is obtained, quarantine is imposed on the kennel, settlement, or farm by decision of the local authority based on an official report from the district chief veterinary inspector.

Affected animals must be immediately transferred to warm and dry isolation facilities and provided with an appropriate diet. Equipment and cages that have come into contact with infected animals should be disinfected using 2% formalin solution.

Apparently healthy animals should undergo body temperature monitoring, and clinically healthy individuals should be vaccinated against canine distemper. Disinfection mats placed at the entrance to animal enclosures should be regularly moistened with 2% alkaline disinfectant solution. Feeding utensils should be washed with disinfectant solutions. Unauthorized persons should not be allowed access, and protective clothing must be disinfected. During the outbreak, procedures such as weighing, identification marking, and other stressful manipulations should be avoided [12]. Manure should be rendered harmless by biothermal treatment.

The skins of dead fur-bearing animals should be removed within the isolation facility, dried at 25–33°C for three days, then stored at room temperature for ten days before disposal of the carcasses by incineration.

Final disinfection is carried out 30 days after the last recovery or death. Quarantine is lifted by decision of the local authorities based on the official report of the district chief veterinary inspector. Dogs may be removed from the affected premises 1.5 months after quarantine is lifted, whereas fur-bearing animals may only be removed after six months [13].

Diagnosis

The wide variety of clinical manifestations makes early diagnosis of canine distemper difficult. Diagnosis is based on epizootiological, clinical, pathological, and laboratory findings.

When making a clinical diagnosis, the following six signs are considered:

Diarrhea;

Inflammation of the respiratory tract;

Inflammation of the conjunctival and nasal mucous membranes;

Hyperkeratosis of the footpads;

Central nervous system involvement;

Disease duration of at least three weeks.

If four out of these six clinical signs are present, canine distemper should be strongly suspected [14].

At the early stage of the disease, the following five signs are particularly important:
Cough;
Photophobia;
Fever accompanied by loss of appetite;
Normal body temperature despite a good appetite;
Neurological signs.
If two of these five signs are observed, canine distemper should be suspected.

In complicated cases, biological testing may be performed by inoculating 30–45-day-old puppies, fox cubs, polecats, or minks with pathological material (blood collected during the febrile stage or suspensions of parenchymal organs) [15].

Complement Fixation Test (CFT), Immunodiffusion Reaction (IDR), and Neutralization Reaction (NR) are used for diagnosis. Virus identification is confirmed by the Neutralization Reaction, in which 5% specific antiserum is added to virus-infected cell cultures, and the results of viral neutralization are evaluated.

4. Conclusion

Canine distemper remains one of the most serious viral diseases affecting domestic dogs and other carnivorous animals due to its high contagiousness, multisystemic involvement, and significant mortality, particularly among unvaccinated puppies. The disease continues to pose substantial veterinary and economic challenges despite the availability of effective vaccines.

Early diagnosis using modern laboratory techniques such as PCR and ELISA, together with careful clinical evaluation, plays a crucial role in the timely detection and management of the disease. Prompt isolation of infected animals, implementation of strict veterinary-sanitary measures, and continuous epidemiological surveillance are essential for preventing disease transmission.

Vaccination remains the most reliable and cost-effective method of controlling canine distemper. Maintaining appropriate vaccination schedules, ensuring proper animal husbandry practices, and increasing public awareness among pet owners and veterinary professionals can significantly reduce the incidence of the disease. In addition, effective quarantine procedures and biosecurity measures contribute substantially to controlling outbreaks in kennels and other animal populations.

In conclusion, comprehensive preventive strategies combining vaccination, early diagnosis, biosecurity, and veterinary monitoring are essential for minimizing the spread of canine distemper, improving animal health and welfare, and reducing the economic losses associated with this disease.

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