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REVOLUTIONIZING RABIES CONTROL:A MODERN APPROACH TO TACKLING INDIA'S CANINE CRISIS

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Abstract - *Rabies presents as an acute Inflammation of the brain and spinal cord in humans and animals, caused by the rabies virus. The virus is commonly transmitted through animal bites. Throughout history, Rabies has left a significant mark . Globally , dogs serve as the primary carriers, while wild animals, particularly bats, pose the most significant threat to humans in North America . Following an Incubation period , the rabies virus spreads rapidly through the nervous system using fast axonal transport. Rabies can be effectively prevented if recognized promptly after an Animal bite through proper wound cleansing and the administration of Rabies vaccine and immune globulin.*

***KeyWords*: Rabies, Vaccines, Fatalities, Dog bites, Prognosis**

1.INTRODUCTION

"A stitch in time saves nine, especially with rabies."

Rabies is an acute viral disease, one of the most important Zoonotic diseases, that causes Encephalitis (Inflammation of the brain) in humans and warm -blooded animals. It is historically referred to as Hydrophobia (i.e.,fear of water). It is primarily transmitted through saliva/bites/scratches/licks from rabid Animals. This virus belongs to RHABDOVIRIDAE family (Genus : Lyssavirus), with a distinct bullet shape and a genome encoding with five proteins – Nucleoprotein(N), Phosphoprotein(P), Matrix protein(M), Glycoprotein(G) and polymerase(L).

2.OBJECTIVE

1) The aim of this article is to understand the causes, risk factors, treatment , clinical features, prevention and other aspects of Rabies.

2) The investigative study was carried out from online resources like scholarly journals and articles authored by numerous well – known experts in the fields.

3.METHOD OF STUDY

CAUSES

1] Bite from an Infected animals namely bats, raccoons , cats, dogs, Skunk, foxes etc…

2]Scratches from an infected animal.

3] Contact with the saliva or nervous system tissue of an infected Animal.

SYMPTOMS

Early symptoms(1-2 weeks after exposure):

- Fever.
- Headache.
- Weakness.
- Malaise.
- Anorexia.
- General discomfort.
- Nausea.
- Pharyngitis • Emesis.

Neurological symptoms(2-4 weeks after exposure):

- Hydrophobia.
- Muscle spasms.
- Seizures.
- Paralysis.
- Confusion.
- Anxiety.
- Agitation.
- Hallucinations.
- Insomnia.
- Abnormal vocalization.

CLINICAL PHASES

Rabies typically progress through several stages:

Incubation period:

- It is typically 2-3 months, and varies significantly from 1 week to 1 year, depending on factors like location of the virus entry and the viral load.

Prodromal period:

- In this period, Rabies lasts 2-10 days and is characterized by mild and nonspecific symptoms, eg. Malaise Chills, Fever, Headache, Photophobia,

Anorexia, Nausea, Vomiting, Diarrhoea, Sore throat, Cough, and musculoskeletal pain.

Acute neurological period:

- In this period Rabies lasts 2-7 days and is associated with objective signs of central nervous system dysfunction.

Paralytic period:

- In the paralytic form of Rabies, paralysis develops from the outset, it usually runs less dramatic and longer course than the furious form. Muscles gradually becomes paralyzed, starting from the wound site. A coma slowly develops, which is fatal.

DIAGNOSIS :

Laboratory Testing

- **Direct fluorescent Antibody (DFA) Test:**

It Involves examining brain tissue samples (usually obtained post-mortem) for the presence of the Rabies virus using fluorescent antibodies.

- **Polymerase chain reaction (PCR):**

It detects viral genetic material(RNA)in saliva, cerebrospinal fluid, or brain tissue. This method is specifically useful in diagnosing Rabies before the onset or in cases where brain tissue samples are not available.

Other Diagnostic Tests

- **Serology:**

Blood tests can detect the antibodies produced by the immune system in response to Rabies virus exposure. But are not typically used for diagnosing acute Rabies infections due to their sensitivity and specificity.

- **Immunohistochemistry**:

In this method uses antibodies to detect viral antigens in tissue samples, such as skin biopsy specimens or corneal impressions.

Differential Diagnosis

Several other conditions can mimic the clinical features of Rabies, including other viral Encephalitides,tetanus and psychiatric disorders. A thorough evaluation is mandatory to ensure the presence of Rabies.

- **Post-mortem Diagnosis**

In cases where the patient has died and Rabies is suspected, post-mortem examination of brain tissue is performed to confirm the Diagnosis using DFA testing or PCR.

TREATMENT

It usually Involves:

- 2 or more doses of the Rabies vaccine, for example; **RabAvert and Imovax.**
- Both are three-dose schedule vaccines.
- They give you 10 years of immunization.
- Boost shots can be given every 6 to 24 months.

NOTE: Egg allergy sufferers should avoid RabAvert.

Human rabies immune globulin (HRIG).

- Shots are given around the wound. HRIG gives you the antibodies that will destroy the virus near the wound until the body takes over. **NOTE: HRIG should be avoided if the individual has been vaccinated before the exposure.**

4.DATA ANALYSIS AND EPIDEMIOLOGY

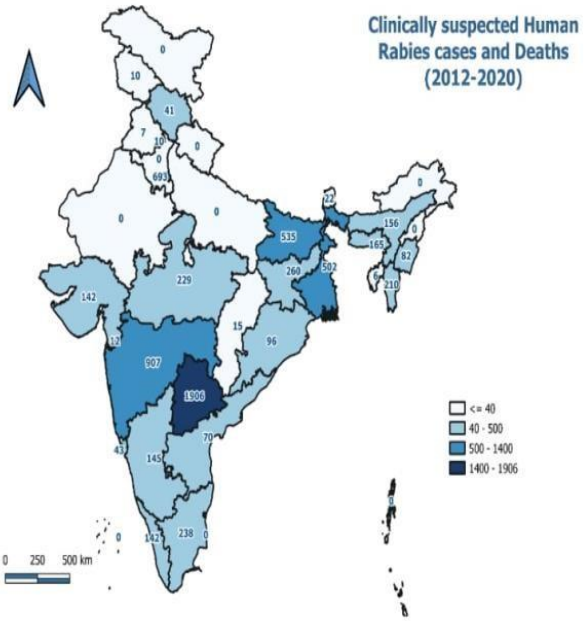

Figure 1: National Rabies control programme (NRCP) Data for clinically suspected human rabies cases And death (2012-2020), data taken from 26 states.

TABLE 1: The frequency of dog bites has risen steadily since 2021, and within a span of three years ,it has doubled.

YEAR	NUMBER OF DOG BITES	BITES PER DAY
2018	75,67,811	20,734
2019	72,77,523	19,338
2020	46,33,493	12,695
2021	17,01,133	4,661
2022	21,80,185	5,973
2023	24,77,936	8,151

However, the number of dog bite cases was quite high in 2018. There were over whopping 75 lakh dog bite cases reported in 2018 which decreased to over 72 lakh and 46 lakh in subsequent years 2019 and 2020,respectively. Surprisingly, then after number of dog bite cases sharply declined by more than twice.

The Ministry of Health and Family welfare and the Ministry of Fisheries, Animal Husbandry & Dairy inguinal jointly launched the National Action plan for Dog Mediated Rabies Elimination in the year 2021.

TABLE 2: Arrangement of most to least, the counts of cases and fatalities caused by rabies in different States of India.

STATE	DOG BITE CASES	DEATHS
MAHARASHTRA	4,35,136	29
TAMILNADU	4,04,488	20
GUJARAT	2,41,846	16
BIHAR	2,19,086	21
UTTAR PRADESH	2,18,379	4,300
KARNATAKA	2,08,656	29
ARUNACHAL PRADESH	3,757	3
MANIPUR	2,511	4
LADAKH	2,316	-
MIZORAM	1,035	734
NAGALAND	569	2

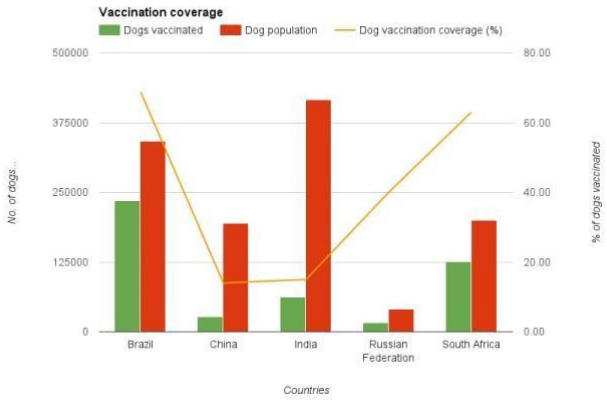

FIGURE 2:India,among the BRICS Nations,boasts the largest population of dogs and ranks among the Lowest in terms of vaccination rates.

5.SUGGESTION

Given the surge in animal bite incidents and rabiesrelated fatalities, it is imperative for India to contemplate employing pre-exposure Prophylaxis (prEP) as an interim measure until effective canine control is established. Furthermore, all youngsters residing in high-risk areas should receive PrEP as a preventive measure. Additionally, a collaborative approach for sharing vaccines and Rabies immune globulin(RIG) across states during emergencies should be adopted. The availability of essential resources should be transparently showcased on online platforms like e-Raktkosh in numerous Healthcare facilities situated in high-risk zones. Encouraging the adoption of stray dogs and implementing stringent regulations on pet ownership are crucial steps to minimize the presence of dogs on public roads. To sum up, there is a pressing need for a holistic and coordinated strategy concerning stray dog management and bite prevention protocols.

Some important guidelines must be followed by the individual in order to prevent Rabies, including:

If You are bitten or scratched by an Animal ,

- Wash the wound with soap and water.
- Contact your Healthcare provider as soon as possible.
- You may need to get a vaccine to prevent a rabies(post exposure prophylaxis/PEP).
- Make sure your pets vaccinations are up-todate.
- Do not let your pets roam free without supervision.
- Leave wildlife alone.
- Do not touch Injured animals.

- Dogs are the most common source of Rabies in India , so minimize contacts with dogs to reduce the risk of Contracting rabies.
- If you are at high risk for rabies, ask your Healthcare provider about PrEP.
- If you have been attacked by an aggressive wild animal, call animal control.

5.CONCLUSION

Rabies Encephalitis persists as an overlooked tropical ailment that disproportionately impacts the most marginalized communities globally ,posing significant clinical hurdles. Persistent and courageous rescue endeavors have advanced our comprehension of Rabies virus (RABV) pathology and it's course in nature. Sustained dedication within the rabies research sector has yielded additional revelations that could pave the way for prospective treatments. Innovative strategies for treatment could ideally involve a comprehensive approach integrating antiviral medication, immunotherapy, and neuroprotective measures.

Rabies continues to be a significant pubic health hazard underestimated in majority of member countries of the Middle East region. The situation in some countries has worsened due to the emergence of Rabies in the region , especially in wildlife, due to deteriorating environment. As a consequence in a majority of countries of the region the number of post-exposure prophylaxis provided has steadily increased over time. Countries of the region are spending increasing part of their health budget on procurement of modern rabies vaccines and immunoglobulins to meet the increasing demand for Rabies post-exposure treatment. The region as a whole experiences shortage in vaccines and immunoglobulins. Vaccinations of domestic animals remain limited in the region and insufficient for the control of Rabies. Public health education and awareness are still insufficient to contribute to national Rabies control and prevention programmes.

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