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Research Article

Profile of HRIG Utilization among Category III Animal Bite Patients Attending an Anti-Rabies Clinic: A Cross-Sectional Study

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A B S T R A C T

Background: Rabies remains a major public health challenge in India despite the availability of effective post-exposure prophylaxis (PEP). Human Rabies Immunoglobulin (HRIG) plays a crucial role in the management of WHO Category III animal bite exposures by providing immediate passive immunity. However, HRIG utilization remains inadequate in many tertiary care anti-rabies clinics because of delayed presentation, limited availability, and operational challenges.

Objective: To assess the utilization profile of HRIG among WHO Category III animal bite patients attending a tertiary care anti-rabies clinic and to identify factors associated with its non-utilization.

Methods: A hospital-based descriptive cross-sectional study was conducted at the Anti-Rabies Clinic of a tertiary care teaching hospital from July 2025 to December 2025. Out of 2316 patients attending the ARV OPD during the study period, 1829 patients with WHO Category III animal bite exposure were included using a universal sampling technique. Data regarding sociodemographic characteristics, bite profile, HRIG utilization pattern, and reasons for non-utilization were collected using a predesigned semi-structured questionnaire and treatment records. Data were analyzed using Jamovi software and expressed as frequencies and percentages.

Results: Among the 1829 Category III animal bite patients, HRIG was administered to 631 (34.5%) patients. The majority of the patients were males (64.5%) and from rural areas (69.1%). Dog bites constituted 89.5% of exposures, while lower limb bites were the most common site of injury (60.3%). HRIG utilization was higher among children below five years, head and neck bite victims, patients with multiple deep wounds, and individuals with comorbidities. Delayed presentation after initiation of ARV beyond the recommended period (36.6%), healed or minor-appearing wounds (27.1%), limited HRIG availability (22.1%), and patient refusal (14.2%) were the major reasons for non-utilization. Adverse reactions following HRIG were minimal and predominantly mild local reactions.

Conclusion: HRIG utilization in the tertiary care anti-rabies clinic was selectively prioritized for high-risk exposures. Delayed healthcare-seeking behavior and limited HRIG availability were major barriers to optimal utilization. Strengthening uninterrupted HRIG supply, increasing public awareness regarding early reporting after animal bites, and implementing standardized institutional protocols may improve adherence to rabies PEP guidelines in tertiary care settings.

Keywords: Rabies, HRIG, Anti-rabies clinic, Category III bite, Rabies immunoglobulin, Post-exposure prophylaxis

Introduction

Rabies is an acute progressive viral encephalitis with an almost universally fatal outcome once clinical symptoms develop.[1,3,4] The disease continues to pose a significant public health challenge in India despite being entirely preventable through timely post-exposure prophylaxis.

Post-exposure prophylaxis (PEP) plays a crucial role in rabies prevention and includes immediate wound washing, administration of the anti-rabies vaccine (ARV), and infiltration of rabies immunoglobulin (RIG) for Category III exposures as recommended by WHO and Government of India guidelines.[1,2,5]

Human Rabies Immunoglobulin (HRIG) provides passive immunity by neutralising the virus locally at the wound site until active immunity develops following vaccination.

Despite recommendations by the World Health Organisation (WHO) and National Rabies Control Programme (NRCP), HRIG utilisation remains inadequate in many healthcare facilities. 2.6 High cost, restricted supply, lack of awareness, delayed healthcare-seeking behaviour, and improper prioritisation contribute to underutilisation.

In resource-limited tertiary care settings, HRIG is often selectively administered to patients considered at higher risk of developing rabies, including young children, patients with bites over highly innervated regions such as the head and neck, and individuals with comorbidities or immunocompromised states.

The present study was undertaken to assess the profile and utilisation pattern of HRIG among Category III animal bite patients attending a tertiary care anti-rabies clinic.

The PMP MCH Talcher was started by the Govt of Odisha in December 2024. The Department of Community Medicine took over the ARV Clinic (which was running at District Headquarters Hospital, Angul, & managed by the district health official) from March 2025 onwards. Previously, not a single dose of HRIG was used at ARV OPD despite its availability at the Central Store, DHH, Angul.

Objectives

Primary Objective

To assess the utilization profile of HRIG among Category III animal bite patients attending the Anti-Rabies Clinic.

Secondary Objectives

- To describe the sociodemographic characteristics of Category III animal bite patients.
- To determine the pattern and timing of HRIG administration.
- To identify high-risk groups prioritized for HRIG administration.
- To identify factors associated with non-utilization of HRIG.

Materials and Methods

Study Design

Hospital-based Descriptive cross-sectional study.

Study Setting

The study was conducted at the Anti-Rabies Clinic attached to a new tertiary care teaching hospital (PMP MCH, Talcher, Angul, Odisha).

Study Duration

July 2025 to December 2025.

Study Population

All WHO Category III animal bite patients attending the Anti-Rabies Clinic during the study period.

Inclusion Criteria

- Patients with WHO Category III animal bite exposure.
- Patients willing to participate.

Exclusion Criteria

- Incomplete clinical records.
- Sampling Technique
- Universal sampling technique.

Sample Size

A total of 2316 patients attended the ARV OPD during the study period. Among them, 1829 patients fulfilling WHO Category III exposure criteria were included in the study using universal sampling method.

Thus, the final study sample comprised 1829 Category III animal bite patients, out of which 631 (34.5%) patients received HRIG.

Data Collection

Data were collected using a predesigned semi-structured questionnaire and treatment records from the Anti-Rabies Clinic.

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The following variables were assessed:

- Age and sex
- Residence
- Type of animal
- Site of bite
- Time elapsed before reporting
- Presence of comorbidities
- HRIG administration status
- Reason for non-utilization
- ARV initiation status

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Jamovi. Descriptive statistics were expressed as frequencies and percentages.

Results

A total of 2316 animal bite patients attended the ARV OPD during the study period from July 2025 to December 2025. Among them, 1829 patients were categorized as WHO Category III exposures and were included in the study.

Out of the 1829 Category III patients, HRIG was administered to 631 (34.5%) patients, while 1198 (65.5%) patients did not receive HRIG.

Table 1.Sociodemographic Profile of Study Participants

(N=1829)

Variable	Frequency(n)	Percentage
Age <5 years	278	15.2
5–18 years	499	27.3
19–45 years	781	42.7
>45 years	271	14.8
Male	1180	64.5
Female	649	35.5
Rural residence	1264	69.1
Urban residence	565	30.9

Majority of the patients belonged to the economically productive age group of 19–45 years. Male predominance was observed. Most patients were from rural areas.

Table 2.Bite Characteristics among Category III Animal Bite Patients

Variable	Frequency(N=1829)	Percentage
Dog bite	1637	89.5
Cat bite	128	7.0
Monkey bite	42	2.3
Other animals	22	1.2
Lower limb bites	1103	60.3
Upper limb bites	421	23.0
Head and neck bites	223	12.2
Multiple site bites	82	4.5
Reporting within 24 hours	984	53.8
Reporting after 24 hours	845	46.2

Dog bites were the predominant exposure. Lower limb bites were most common, while head and neck bites accounted for 12.2% of cases.

Table 3. HRIG Utilization Profile among Study Participants

(N=1829)

Variable	Frequency (n)	Percentage (%)
HRIG administered	631	34.5
HRIG not administered	1198	65.5
HRIG administered within 24 hours	439	69.6*
Delayed HRIG administration (>24 hours)	192	30.4*
Local wound infiltration performed	631	100*
Residual HRIG administered intramuscularly	248	39.3*
Adverse reactions observed	18	2.9*
No adverse reactions observed	613	97.1*
Mild local pain/ swelling	11	61.1**
Fever	5	27.8**
Allergic reaction	2	11.1**

* Percentages were calculated using HRIG recipients (n = 631) as denominator.

** Percentages were calculated using patients who developed adverse reactions following HRIG administration (n = 18) as denominator.

Approximately one-third of Category III bite patients received HRIG during the 6-month study period. Almost all patients received ARV. Adverse reactions were minimal.

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Table 4. Priority Groups Receiving HRIG

Priority Group	HRIG Received	Percentage (%)
Children <5 years (n=278)	173	62.3
Head and neck bites (n=223)	159	71.4
Patients with comorbidities (n=156)	92	58.8
Multiple bite wounds (n=82)	59	72.2
Deep lacerated wounds (n=187)	119	63.4

*Percentages in this table were calculated within each specific high-risk subgroup and not from the total study population

HRIG utilization was highest among patients considered clinically high-risk, particularly head and neck bite victims, young children, and patients with comorbidities.

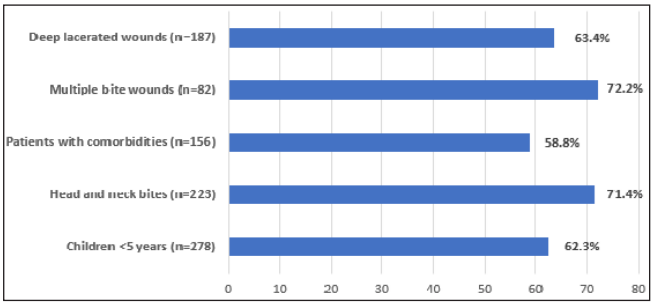

Figure 1.Distribution of HRIG Administration among High-Risk Groups

Table 5. Reasons for Non-utilization of HRIG

(n=1198)

Reasons	Frequency	Percentage (%)
Delayed presentation after initiation of ARV	438	36.6
Healed/minor appearing wounds at presentation	325	27.1
Limited HRIG availability	265	22.1
Patient refusal (RIG administration)	170	14.2

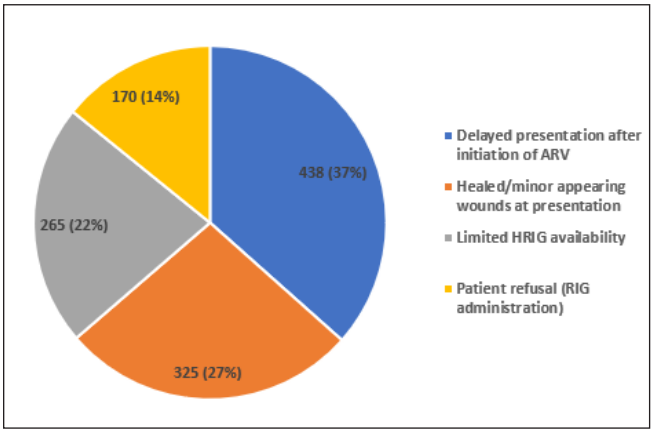

Figure 2.Reasons for Non-utilization of HRIG

Delayed presentation after initiation of ARV at other health facilities was the most common reason for non-utilization of HRIG. A substantial proportion of patients also presented with healed or apparently minor wounds, leading to deferment of HRIG administration based on clinical assessment. Limited HRIG availability and patient refusal further contributed to non-utilization. Patient refusal because of fear of injections, reluctance for wound infiltration, leaving before administration, and cultural beliefs are also some of the reasons for non-utilization of HRIG in our setting.

Discussion

The present study assessed the utilization profile of HRIG among category III animal bite patients attending a new tertiary care anti-rabies clinic.

The study included all eligible WHO Category III animal bite patients attending the Anti-Rabies Clinic during the six-month study period using a universal sampling technique. This approach improved representativeness and minimized selection bias, thereby strengthening the validity of the findings.

The majority of the patients were males and belonged to rural areas, findings similar to several Indian studies on animal bite epidemiology. Dog bites constituted the overwhelming majority of exposures, emphasizing the continuing burden of canine rabies transmission in India, similar to findings reported in earlier Indian studies.[3,4]

Only 34.5% of Category III bite patients received HRIG. This comparatively lower utilization reflects operational challenges commonly encountered in tertiary care anti-rabies clinics, particularly delayed presentation of patients and limited HRIG availability.

A similar Study at SCB MCH, Cuttack, Odisha states that safety of HRIG in Children is good with minimal side effects (5%) as only local reaction.[7]

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A noteworthy observation in the present study was the selective prioritization of HRIG administration. HRIG was predominantly administered to:

- children below five years,
- patients with head and neck bites,
- patients with multiple deep wounds,
- and patients with comorbid conditions.

This prioritization reflects rational clinical decision-making in resource-constrained settings. Young children are particularly vulnerable because of inability to communicate exposure properly, delayed reporting, and increased risk of severe disease. Similarly, bites over highly innervated regions such as the head and neck are associated with shorter incubation periods because of proximity to the central nervous system.

Many patients presented after initiation of ARV at other health facilities (delay reporting) for HRIG administration, reducing the feasibility and perceived benefit of HRIG infiltration. In addition, some patients presented with apparently minor healed wounds where HRIG administration was deferred based on clinical assessment.

Limited institutional availability of HRIG further contributed to selective administration practices, necessitating prioritization of high-risk exposures. Such risk-based allocation strategies are frequently adopted in high-burden tertiary care settings to optimize utilization of available HRIG stock.

Adverse reactions to HRIG were minimal and mild, supporting its safety profile in routine clinical use.

The findings of the present study highlight the need for strengthening uninterrupted HRIG supply, improving public awareness regarding early reporting after animal bites, and implementing standardized institutional protocols for rational HRIG utilization.

Conclusion

HRIG utilization among Category III animal bite patients in the tertiary care Anti-Rabies Clinic was selective and primarily targeted toward high-risk groups such as children below five years, head and neck bite victims, patients with deep multiple wounds, and individuals with comorbidities.

Delayed presentation, healed or apparently minor wounds at presentation, and limited HRIG availability were major determinants of non-utilization.

Institutional standard operating procedures, uninterrupted HRIG supply, early healthcare-seeking behavior, and risk-based prioritization can substantially improve compliance with rabies post-exposure prophylaxis guidelines in tertiary care settings.

Recommendations

- Ensure uninterrupted and adequate supply of HRIG in tertiary care hospitals.
- Increase public awareness regarding immediate reporting and early wound washing following animal bites.
- Strengthen training of healthcare workers regarding appropriate HRIG infiltration techniques and rational utilization practices.
- Develop institutional protocols for risk-based HRIG prioritization during periods of limited availability.
- Improve documentation and follow-up mechanisms in Anti-Rabies Clinics.

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