Original Article

Effectiveness of Digital Tools for Enhancing Community Awareness on Rabies: Supporting the National One Health Mission

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Abstract

Background: Rabies is a public health concern, and enhancing community awareness is key to preventing the disease. In this study, the researchers focused on the effectiveness of digital tools in improving schoolchildren's knowledge of rabies in support of the National One Health Mission. **Material and Methods:** A quasi-experimental study was conducted with 252 students in two four-year-old primary schools, comprising a Lecture Only Group (n=126) and a Lecture + Audiovisual (AV) Group (n=126). They both had a standardized lecture on rabies, and the AV group also watched audiovisual material. Knowledge retention was measured using a structured questionnaire administered as a pre-test and 1 week after the intervention. The participants' engagement and perceptions were also considered secondary outcomes, recorded through the feedback forms. **Results:** Baseline characteristics were similar across groups. Knowledge scores improved in both groups, with the Lecture + AV Group showing a substantially higher gain (pre-test 43.1 ± 7.8; post-test 74.6 ± 6.9; 73.1% improvement) compared to the Lecture-Only Group (pre-test 42.5 ± 8.2; post-test 58.3 ± 7.6; 37.2% improvement). The participant responses and perceived comprehension were also higher in the Lecture + AV Group, with 91% of participants finding the session interesting and 88% saying they understood better, compared to 55% and 60% in the Lecture-Only Group. These trends are reflected in preference towards future sessions (85% vs. 50%). **Conclusion:** The inclusion of audiovisual tools to supplement traditional lectures can greatly enhance knowledge retention, engagement, and understanding among schoolchildren. School-based activities and digital tools are useful in rabies education. They can reinforce community awareness, which aligns with the National One Health Mission.

Keywords: Rabies, Health Education, Schoolchildren, Digital Tools, Knowledge Retention, One Health.

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Introduction

Rabies is a deadly but avoidable zoonosis that has a skewed impact in India. The latest national representative estimates (20222023) indicate 17.4 million animal bites each year and 20,565 human rabies deaths, indicating a significant lack of detection and reporting at the State health system level.[1] To effectively eliminate human fatalities in dog-induced rabies, there should be a concerted effort in the human and animal health fields- mass dog vaccination, post-exposure prophylaxis (PEP), timely and complete use of full post-exposure prophylaxis (PEP), and long-term public education in line with a One Health paradigm.[2] At the state level, the implementation shows what is possible: in Goa, an integrated One Health programme integrating mass dog vaccination, increased levels of surveillance, and organized school- and community-based education has led to the eradication of human rabies as well as 92% reduction of cases of canine rabies over 2013 – 2019.[3]

Digital tools are increasingly central to these gains. In Goa, smartphone-enabled field operations guided vaccination teams at sub-village resolution and captured vaccination and surveillance data in real time, while education teams systematically reached schoolchildren and communities.[3] Beyond field logistics, health-worker–facing decision-support applications have been developed in India to standardize prophylaxis decisions after exposures, aiming to close knowledge-practice gaps at the point ofcare.[4] Parallel health systems work highlights the importance of interoperable, cross-sector data flows for early warning and coordinated responses to zoonoses in India, with One Health surveillance frameworks proposing policy and operational pathways for human–animal–environmental data integration.[2] Together, these developments position digital platforms—not only for vaccination operations and surveillance, but also for education and clinical decision support—as enablers of India's One Health ambitions.

Most importantly, Awareness deficiency and delayed or incomplete PEP are some of the preventable causes of mortality; systematic education has the potential to enhance societal awareness and visiting the clinic following an animal bite. Recent

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systematic reviews found that educational interventions delivered in schools and communities were uniformly effective in increasing knowledge of bite wound care, PEP, and rabies prevention, leading to an important role of scalable digital education and blended models (e.g., school sessions reinforced with multimedia content, messaging, and interactive modules).[5] Meanwhile, assessments of health facilities continue to report an uneven distribution of access to anti-rabies vaccine and rabies immunoglobulin in India, confirming the need for demand-generation and navigation instruments that stimulate timely presentation and completion of PEP when biologics are available and help patients find facilities where they are kept.[6]

It is against this background that it is important to assess digital tools to increase community awareness, as this is relevant to policy. Digital strategies can complement vaccination and surveillance efforts, promote earlier care-seeking, and operationalize One Health in the community by targeting school-age children and their families, where exposure burden is high, and by intervening in primary care and through outreach in veterinary care. The given quasi-experiment study consequently evaluates the efficacy of the digital tools in enhancing the level of rabies awareness among the rural schools, and the overall goal is to enlighten the scalable measures that help India to pursue its goals in rabies eradication through a One Health-focused agenda.

Materials and Methods

Study Design and Setting: A quasi-experimental study was carried out to determine the effectiveness of the digital tools in increasing community awareness of rabies. The participants were recruited from two government primary schools in the same Gram panchayat within the field practice area of the Rural Health Training Centre (RHTC). The schools were chosen based on similar demographic and socioeconomic features to make both groups comparable.

Ethical Approval: In total, 252 students were used, with the sample size being grade 5-7, where each school was assigned 126 students. The research was examined and approved by the Institutional Ethics Committee, [Name & Address of Company], which issued approval under the number IEC/[Approval No.], dated [DD Month YYYY]. This is because all study procedures were carried out in accordance with the institutional ethics committee and in respect of the principles presented in DHC. The recruitment process was simplified by involving the school authorities. Informed consent was obtained in writing from parents or legal guardians before data collection, and all data were de-identified to preserve privacy.

Intervention: The subjects became divided into 2 groups-

- **Lecture-Only Group:** Students were provided with a routine lecture-based presentation on rabies, including how it is transmitted, clinical manifestations, preventive actions, and post-exposure prophylaxis.
- **Lecture + Audiovisual (AV) Group:** The students were provided with the content of the lecture with added audiovisual materials intended to emphasize the main concepts.

Delivery of every session was carried out by trained health educators, with a set protocol meticulously followed across groups,[7] to ensure consistency.

Data Collection: Knowledge acquisition and retention were measured by the use of a structured questionnaire that was used as a pre-test, one week before the intervention, and as a post-test, one week following the sessions. The participants' interactions and perceptions regarding the teaching techniques were measured using a feedback form.

Outcome Measures:

- Primary Outcome: Change in knowledge, measured as the difference between pre-test and post-test scores.
- Secondary Outcomes: Levels of participant engagement and subjective perceptions of the teaching methods, as reported in feedback forms.

Statistical Analysis: The data entry and analysis were performed with the use of SPSS 24.0 software (IBM Corp., Armonk, NY, USA). The mean and standard deviation were used to summarize continuous variables (pre-test and post-test scores), whereas frequencies and percentages were used to present categorical variables. A paired t-test was used to compare the groups' knowledge scores before and after the intervention. The independent t-test was used to assess between-group differences in post-test scores. The approaches used to analyze participant engagement and perception data included analyzing feedback forms descriptively. All analyses were considered statistically significant at $p < 0.05$.

Results

The study involved 252 students, with 126 in each group. The average age of people in the Lecture-Only Group was 11.2 ± 1.3 years, and in the Lecture + AV Group was 11.4 ± 1.5 years. There was no significant difference in gender distribution, with 51.6% and 53.2% in the Lecture-Only Group and Lecture + AV Group, respectively [Table 1].

Table 1: Baseline Characteristics of Study Participants

Characteristic	Lecture-Only Group (n=126)	Lecture + AV Group (n=126)
Age (years), Mean ± SD	11.2 ± 1.3	11.4 ± 1.5
Gender		
Male	65 (51.6%)	67 (53.2%)
Female	61 (48.4%)	59 (46.8%)

Both groups demonstrated improved knowledge following the intervention. In the Lecture-Only Group, the mean pre-test score was 42.5 ± 8.2, and the post-test score increased to 58.3 ± 7.6. The Lecture + AV Group showed a higher gain, with pre-test and post-test scores of 43.1 ± 7.8 and 74.6 ± 6.9, respectively [Table 2]. The percentage improvement in knowledge was 37.2% for the Lecture-Only Group, compared to 73.1% in the Lecture + AV Group [Figure 1].

Table 2: Comparison of Pre- and Post-Test Scores between Study Groups

Group	Pre-Test Score (Mean ± SD)	Post-Test Score (Mean ± SD)
Lecture-Only Group	42.5 ± 8.2	58.3 ± 7.6
Lecture + AV Group	43.1 ± 7.8	74.6 ± 6.9

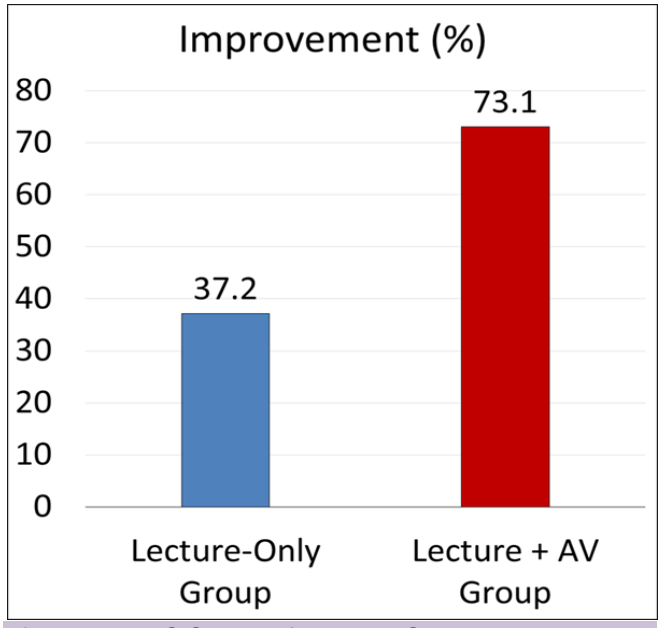

Figure 1: Knowledge retention among the two groups

The audiovisual material introduction was connected with an increased level of engagement and comprehension. In the Lecture + AV Group, 91 percent of participants indicated that the session was engaging, compared to 55 percent in the Lecture-Only Group. Equally, 88 percent of the students in the Lecture + AV Group said their understanding of the content is improved compared to 60 percent in the Lecture-Only Group. Respondents were asked, regarding future preference, whether they preferred this type or not, and 85 percent of the Lecture + AV Group said so, after 50 percent of the Lecture-Only Group [Figure 2].

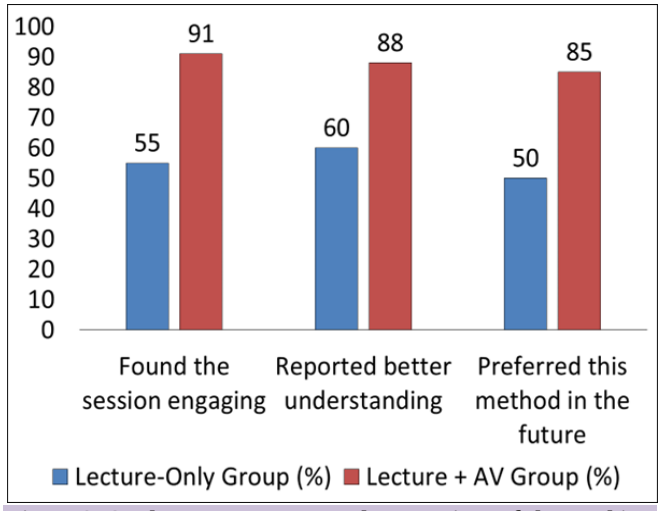

Figure 2: Student Engagement and Perceptions of the teaching methods

[Table 3] shows the synthesized learning enhancement and engagement of the two study groups. Lecture + AV Group had a significantly higher knowledge gain, at 73.1 per cent. compared to 37.2 per cent. Improvement of the Lecture-Only Group. Interest levels were also significantly higher in the Lecture + AV Group, with 91% of the specific group finding the session engaging, compared with 55% in the Lecture-Only Group. Likewise, 88 percent of students in the Lecture + AV Group reported a better understanding of the material, as did 60 percent of students in the Lecture-Only Group. When asked about future preferences for teaching methods, 85% of participants in the Lecture + AV Group preferred this approach. In contrast, only 50% of participants in the Lecture-Only Group did.

Table 3: Knowledge Improvement and Participant Engagement by Study Group

Outcome	Lecture-Only Group (n=126)	Lecture + AV Group (n=126)
Knowledge Improvement (%)	37.2	73.1
Found the session engaging (%)	55	91
Reported better understanding (%)	60	88
Preferred this method for future sessions (%)	50	85

Discussion

This quasi-experimental study demonstrates that structured, digital, school-based education can meaningfully improve rabies awareness among adolescents and aligns with global evidence that classroom interventions are effective for building core knowledge and preventive behaviors in endemic settings.[10-12] In particular, our findings parallel recent school programs in India and the region that reported significant pre- to post-intervention gains in knowledge scores and improved recall of key first-aid steps (soap-and-water wound washing, prompt health-facility attendance) after brief, standardized lessons delivered with audiovisual materials.[10-12] In addition to a change in immediate knowledge, integrated education within current curricula has been linked to long-term benefits and, in certain environments, to a decrease in the rate of reported bites, highlighting the importance of focusing efforts on more than one-time campaigns and the implementation of programs.[10,12]

The overall One Health justification for combining human-centered education with digital tools to scale up the rabies prevention cascade is also supported by our findings. In the Indian state-based eradication program in Goa, evidence showed that mobile technology and integrated education efforts were key to achieving zero human rabies mortality, mass dog vaccination, and enhanced surveillance.[3] In line with this, the eIBCM platforms have enhanced case detection, promptness in

investigating cases, and the quality of data to support decision-making, which is highly needed to connect community awareness with rapid risk assessment and the delivery of post-exposure prophylaxis (PEP) to the community.[13] Such digitally empowered workflows can help address the current implementation gap between improved community knowledge and the appropriate choice of care.

It may not be feasible to optimize PEP schedules for multi-dose regimens once health-seeking has begun. Randomized assessments have shown that low-cost digital nudges (e.g., SMS messages or phone calls) can strongly increase the rate of PEP completion, suggesting that follow-up messaging complements once risk recognition is primed by school-based awareness-raising campaigns.[14,15] Two-way SMS reminders led to better attendance at subsequent vaccine doses in Kenya, and a randomized study in India concluded that telephone reminders outperformed usual care.[3,14] Incorporating such adherence measures into community-based educational packages can thus enhance the practical nature of awareness programs.

Politically, online education and surveillance complementation align with the observation that economic models indicate the integrated approach to One Health, such as IBCM and dog inoculation, is economically efficient in endemic, resource-constrained environments.[16] Digital tools can create a more impactful, affordable reduction in unnecessary PEP use by enhancing early reporting and compliance while prioritizing high-risk exposures to reduce unnecessary PEP use. Combined, the literature indicates that the digital education within the school setting, eIBCM, and reminder systems form the synergy: school-based digital education develops the base of knowledge and protective behaviors, eIBCM reinforces the interface between the communities and the clinicians and veterinarians, and the reminder systems aid the complete adherence to PEP when indicated.[13-16]

This study has limitations. To start with, quasi-experimental designs are subject to residual confounding and can be overstated when other co-interventions cannot be measured. Second, knowledge gains do not necessarily translate to long-term behavior change; longer follow-up, periodic booster sessions, and objective endpoints (e.g., verified PEP initiation and completion after exposures) would strengthen causal inference. Finally, our two-school sample limits generalizability; future multi-site trials that compare pure education versus education plus digital adherence and eIBCM linkages could quantify the added value of each component.

In summary, our findings add to mounting evidence that digital, school-based rabies education is a feasible and effective entry point for community engagement, and that coupling such education with digital adherence can support and help translate awareness into timely, complete, and cost-effective prevention along the One Health continuum.

Conclusion

The integration of audiovisual tools with traditional lecture-based sessions significantly enhanced knowledge retention and engagement among schoolchildren compared to lectures alone. Students in the Lecture + AV Group demonstrated greater improvement in rabies-related knowledge and reported higher levels of understanding, engagement, and preference for this teaching method. These results imply the importance of digital tools in school-based health education programs. They can be an effective method to bolster community awareness of rabies in accordance with the goals of the National One Health Mission.

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Conflicts of interest

There are no conflicts of interest.

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