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Original Research Article

Effectiveness of a community-based awareness session on vaccine knowledge, attitudes and improving dissemination in rural India

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ABSTRACT

Background: One of the most significant barriers to increasing global immunization rate is Vaccine hesitancy (VH). This disparity is underreported in rural India where several misconceptions still persist. The aim of this study was to understand the effectiveness of a community-based intervention on improving the knowledge and attitude amongst people in rural India.
Methods: This was a community based pre- and post- interventional study conducted amongst 158 participants. Data was collected through a structured questionnaire assessing the demographic detail, obstetric and birth history, pre- and post- questionnaire and an open-ended feedback form assessing the effectiveness of the intervention. Paired t-test was used to assess significance between the pre- and post-intervention mean scores and logistic regression was used to identify predictors of willingness to promote vaccine-related information.
Results: The mean pre-intervention score was 11.33±3.11, which increased to 12.92±1.95 post-seminar ($p<0.001$). A total of 85.4% of participants were willing to disseminate the information they learned through the seminar. Logistic regression revealed that participants who did not associate vaccination with religion were significantly more likely to support dissemination ($p<0.001$).
Conclusions: This intervention significantly improved the knowledge score post-intervention and also addressed the common misconceptions regarding hesitancy. Religious beliefs were found to be a key component of hesitancy. Future public health strategies must prioritize such educational interventions to combat vaccine hesitancy.

Keywords: Community-based, Immunization, Public health, Vaccination, Vaccine acceptance

INTRODUCTION

Vaccination is one of the most significant contributions to public health, having substantially decreased morbidity and mortality from infectious diseases. Immunisation has also reduced the burden of preventable diseases and strengthened economic, social, and global health security.[1] Despite this undisputed success, the mission of improving vaccine uptake is endangered globally by a complex concept called vaccine hesitancy. The World Health Organisation (WHO) defines it as a delay in acceptance or refusal of vaccination despite availability of vaccination services.[2] Vaccine hesitancy was declared one of the top ten threats to global health in 2019 by directly undermining herd immunity, leading to gaps in coverage and the resurgence of vaccine-preventable disease outbreaks.[3,4]

The recent COVID-19 pandemic has deeply strengthened this global issue. Although the development of vaccines was a scientific triumph, the misinformation accompanying it has led to increased public anxiety and uncertainity. Regular childhood vaccines felt effects from this. According to data from both WHO and UNICEF in 2020 alone, 23 million children missed routine childhood vaccinations which was the highest number since the year 2009 a total of 3.7 million more than in 2019, threatening to undo decades of progress.[5]

Against this global backdrop of declining vaccination rates, VH is a top-tier public health threat. In order to safeguard global health, there is a need to address each complex and context-specific driver regarding vaccine hesitancy. This study seeks to assess the effect of a community-based intervention on improving the knowledge, and attitudes of participants regarding childhood vaccination among parents throughout rural India. While drivers of VH are well documented in Western nations, a key gap stays in India, especially for studies measuring VH prevalence plus its causes within global VH trend frameworks. This study seeks to fill in this literature gap by providing timely empirical data on VH in India.

METHODS

This was a cross-sectional, pre- and post-interventional study conducted to assess the knowledge, and attitude of people in rural India towards vaccination. The study was conducted in three phases: first the patients were asked to fill a pre-interventional questionnaire, then a community-based seminar dealing with the importance of vaccination in childhood was held, afterwards they were made to fill out a post-interventional questionnaire to test the efficacy of the effectiveness of the community-based intervention. The inclusion criteria of the study included adult participants ≥18 years of age. Those who did not provide consent and submitted incomplete questionnaires were excluded from the study.

Following approval from the Institutional Ethics Committee of Geetanjali Medical College, Udaipur, Rajasthan, the study was carried out from December 2024 to December 2025. A total of 158 participants were enrolled. Four states from North India were chosen using a computer-generated random number table. Subsequently, one rural district from each selected state was identified through convenience sampling, and within that district, one village was further selected by simple random sampling. Participants were then recruited through convenience sampling, considering feasibility and ease of implementation across the four states.

To ensure equal representation from all four states, data from a total of 158 participants were ultimately included in the analysis (40 from Rajasthan, 40 from Uttar Pradesh, and 38 each from Delhi and Jharkhand).

Questionnaire tool and data collection

The data was collected using a structured questionnaire developed using similar studies conducted in the field. The study tool included three domains: demographics data such as age, gender, caste, religion, and maternal education, and obstetric/childbirth history were asked; a closed ended questionnaire (yes/no) assessing the knowledge and attitude of the people towards vaccination (e.g. “Do vaccines decrease the risk of disease?”); and an open-ended questionnaire where questions regarding the primary source of vaccination and their opinion about the seminar were asked. To maintain confidentiality, the participants were asked to fill the questionnaire in private interviews. Forms were checked for completeness and those with incomplete data were excluded from the study.

The intervention

The intervention consisted of a community-based awareness session conducted in small groups. The seminar tackled common misconceptions regarding vaccination; prompting open-ended discussion and active participation. The education component taught about vaccines and their purpose, immunisation schedule, safety and vaccine-preventable diseases.

Sample size calculation

The sample size was determined based on the equation:

$$n = \frac{(Z_{1-\alpha/2})^2 (p\ q)}{d^2}$$

where; n is sample size, taking $\alpha = 0.05$, so $Z_{\alpha/2}=1.96$, power = 80%, p is proportion (94.8%) of caregivers showing a positive mindset regarding immunization from a study done in rural Bihar, and d is the absolute error i.e., 10%.[12] Although, considering the multistage sampling design, a design effect of 2 was applied. And the final sample size was calculated as 38 participants from each state.

Statistical analysis

The data was extracted from the questionnaires and analysed in SPSS (v.26). Descriptive statistics (mean ± SD, frequencies, percentages) were calculated for all variables. The questionnaire consisted of twelve items, with each item offering three response options: yes, maybe, and no; scored as 2, 1, and 0 respectively, the maximum score was 24 and minimum 0. The pre- and post-interventional questionnaire was analysed by using paired t-test. The participants' willingness to further the spread of knowledge they acquired during the seminar (yes and no) was analyzed using logistic regression. Variables with $p < 0.20$ in univariate models were entered into a multivariable logistic regression model. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported. Statistical significance was defined as $p<0.05$.

RESULTS

Demographic variables

After application of inclusion and exclusion criteria, the mean age of participants was found to be 27.4±5.8 years. Amongst this, the majority of participants were female (73%). The majority of participants were Hindu (77.2%), Muslim (16.5%) and other religions (6.3%).

Table 1: Demographic and socioeconomic characteristics of study participants.

Characteristic		Number (%)
Age (Mean±SD)		27.4±5.8 years
Gender	Female	115 (73)
	Male	43 (27)
Religion	Hindu	135 (85.4)
	Muslim	14 (8.9)
	Christian	7 (4.4)
	Other	2 (1.3)
Maternal education	Till 5	32 (20.3)
	Till 10	52 (32.9)
	Till 12	22 (13.9)
	Undergraduate	16 (10.1)
	Post graduate	7 (4.4)
	Uneducated	29 (18.4)
Caste	SC	37 (23.4)
	ST	8 (5.1)
	OBC	60 (38.0)
	General	46 (29.1)
	Other	7 (4.4)
Type of delivery	Vaginal	91 (57.6)
	C-section	67 (42.4)
Place of delivery	Hospital	140 (88.6)
	Home	18 (11.4)
Vaccination status	Yes	152 (96.2)
	No	6 (3.8)

The Educational qualification amongst the participants was: 24.1% had no schooling, 18.4%, primary school (0.6%), completed 10th standard, 16.5% completed 5th standard, 13.3% completed 12th standard, 10.1% completed 8th standard, and a smaller number reported graduate (3.8%), postgraduate (0.6%), and university-level education (0.6%) In the obstetrics history, most births were full-term (95.6%) with approximately 96.2% of births occurring in hospital. The demographic details are presented in Table 1.

Table 2: Knowledge score summary (pre vs post intervention).

Score type	Mean±SD	Median	Min	Max	P value
Pre-seminar score	11.33±3.11	12.0	0	2o	<0.001*
Post-seminar score	12.92±1.95	13.0	6	20	

*Significant

Pre- and post-questionnaire analysis

Knowledge scores improved significantly following the seminar. The mean pre-seminar score was 11.33 (SD=3.11), and the post-seminar mean was 12.92 (SD=1.95). This difference was statistically significant as confirmed by both a paired t-test ($t(157)=5.736$, $p<0.0001$) and a Wilcoxon signed-rank test ($W=1929.5$, $p<0.0001$), indicating a meaningful gain in vaccine-related knowledge. The result is presented in Table 2.

Willingness to disseminate vaccine information

Out of 158, a total of 135 participants (85.4%) were willing to disseminate the vaccination information they learned from the seminar. The data is presented in Table 3.

Table 3: Willingness to disseminate vaccine information.

Response	Count	Percentage
Yes	135	85.4
No	23	14.6

Predictors of willingness to disseminate vaccine information

Multivariable logistic regression was used to identify predictors of willingness to disseminate information. Maternal education showed a positive trend toward increased willingness (AOR=1.67, 95% CI [0.95, 2.93], $p=0.074$). Not associating vaccines with religion was a strong, statistically significant predictor (AOR=0.009, 95% CI [0.002, 0.041], $p<0.001$). Knowledge score was

not a significant predictor (AOR=0.96, 95% CI [0.65, 1.43], p=0.836). The data is presented in Table 4.

Table 4: Multivariable logistic regression predicting willingness to Dissemi.

Predictor	AOR	95% CI (Lower-Upper)	P value
Intercept	20.59	0.094-4487.39	0.271
Knowledge score	0.96	0.65-1.43	0.836
Education level	1.67	0.95-2.93	0.074
Religious association	0.009	0.002-0.041	<0.001*

*Significant

DISCUSSION

The aim of this study was to understand the effectiveness of a community-based awareness session in order to get insights into vaccine hesitancy in rural India. In many developed countries, vaccine hesitancy is often driven by misinformation spread on social media, mistrust in government as well as pharmaceutical institutions.[6,7] India's rural setting reveals a different causation landscape though. Gaps in awareness plus poor health literacy are key factors. Practical challenges compound all of this with items such as limited physical access to healthcare facilities and economic strain. Often parents lack reliable information about vaccination schedules and the purpose of vaccines.[8]

In this study we demonstrated a statistically significant improvement in knowledge post the seminar intervention (p<0.001), highlighting that the seminar was able to bridge the knowledge gap present prior to intervention. Additionally, approximately 85% participants revealed willingness to disseminate the information in their community. The quantitative feedback from individuals asked during their individual interview revealed appreciation for the seminar, with participants quoting *"misconceptions about vaccination got rectified,"* and *"myths regarding vaccination are busted"* (translated verbatim from their native language) highlight the importance of such community-oriented health education. Logistic regression showed that this willingness was strongly associated with not linking vaccination to religion (p<0.001), i.e., participants free from religious misconceptions were far more likely to advocate for vaccination. In a survey examining 67 countries conducted by Larson et al. religious misconceptions were found to hinder vaccine acceptance.[9] In another study done in Nigeria, similar findings were found.[10] Therefore, whereas globally people often consciously reject vaccines based on misinformation, people in rural India frequently hesitate because systemic constraints make acting on the intention to vaccinate deeply challenging.

In this research maternal education showed a positive trend towards increased willingness (AOR=1.67), indicating that education contributed to trust in advice regarding vaccination, however, this did not reach significant value (p=0.074), hence must be interpreted with caution. Although no significant finding was found in our research, in a meta-analysis done by Gebreyesus et al. maternal education more than primary level had a higher chance of completing childhood vaccination.[11]

According to the quantitative interview we conducted of the participants, they reported diverse sources from where they receive their primary information regarding vaccines. Some were verified sources such as doctors, and ASHA workers; others consisted of less verified ones like television, friends and family. This leads to creating equal risk and opportunity. For example, in our research, one participant refused vaccination stating that "having good hygiene makes vaccines unnecessary". Dissemination of such beliefs can create misunderstanding and further vaccine hesitancy. Highlighting the urgent need for holding trusted community-based awareness programs. Our findings suggest that belief-based barriers may have a greater influence on vaccine advocacy than knowledge deficits alone in rural India. Although educational interventions were effective in improving knowledge scores, deeply embedded religious and cultural beliefs appeared to limit the translation of this knowledge into active acceptance. This indicates that public health efforts should extend beyond information provision and incorporate culture sensitive approaches that directly engage underlying belief systems contributing to vaccine hesitancy.

Despite the promising results, one of the major limitations of this study was its short-term assessment. More such longitudinal studies should be conducted to examine whether the knowledge gained during the seminar leads to change in practices towards vaccination.

CONCLUSION

This study demonstrated how community-based educational interventions can change the attitude towards vaccination, proved both by the positive quantitative gains post-intervention and qualitative feedback. Further initiatives should be held on a community basis to dispel myths about vaccination. These interventions can be undertaken by educators like ASHA workers, and on a personal volunteer basis. To determine if increasing vaccination uptake and long-term behavior change result from improved understanding, longitudinal studies are required.

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