



Original Research Article

Simulation-based out-of-hospital cardiac arrest (OHCA) management training and its impact on knowledge, confidence, attitude, and reactivity among railway police officers

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Abstract

Aim: Out-of-hospital cardiac arrest (OHCA) is a time-critical emergency with low global survival rates, primarily due to delays in cardiopulmonary resuscitation (CPR) initiation. In India, railway police officers frequently serve as first responders in public emergencies but often lack OHCA-specific training. This study aimed to evaluate the effectiveness of simulation-based OHCA management training in enhancing the cognitive, psychomotor, and behavioral preparedness of railway police officers.

Materials and Methods: A quasi-experimental one-group pre-test/post-test design was conducted with 200 railway police officers in Western India. A structured simulation-based training module focused on Out-of-Hospital Cardiac Arrest (OHCA) management techniques, emergency protocols, and scenario-based learning. Validated tools assessed knowledge, skills, willingness to help, self-confidence, and attitude before and after the intervention. Data were analyzed using paired t-tests and Chi-square tests ($p < 0.05$).

Results: Post-training improvements were statistically significant across all domains ($p < 0.0001$). Mean knowledge scores increased from 12.48 to 15.11, and skill scores from 10.8 to 16.79. Good to excellent CPR performance rose from 1% to 76.5%. Willingness to help (86.5% to 100%), self-confidence (29% to 100%), and positive attitude (90.5% to 100%) also improved. Significant associations were found between willingness and gender ($p = 0.043$) and education ($p = 0.028$), and between attitude and religion ($p = 0.015$) and income ($p = 0.002$).

Conclusion: Simulation-based training significantly enhances OHCA response readiness among railway police. Integrating such training into law enforcement curricula may improve India's pre-hospital emergency care system.

Keywords: Simulation-based training, Cardiopulmonary resuscitation, Out-of-hospital cardiac arrest, Emergency response, First responders.

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1. Introduction

Out-of-hospital cardiac arrest (OHCA) is a major global public health issue, responsible for approximately 70–80% of all cardiac arrest events and associated with survival rates as low as 10% due to delays in prompt intervention.¹ Early cardiopulmonary resuscitation (CPR) by bystanders or first responders is crucial for improving patient outcomes.² In the Indian context, railway police officers frequently serve as the first line of response in busy public areas like train stations,

yet they often lack adequate training to manage OHCA emergencies effectively.³

Simulation-based training has emerged as a widely accepted and effective approach for enhancing emergency preparedness. It offers an immersive, hands-on experience that improves CPR skills and enhances reaction time and psychological readiness.⁴ International research shows that simulation-based OHCA training significantly improves knowledge, confidence, skill retention, and the willingness to

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intervene in emergencies among both medical and non-medical personnel.⁵

Recent studies in India also reflect similar trends. It is also found that, simulation-based CPR training significantly enhanced emergency response capabilities among EMS personnel in Central India.⁶ Additionally, effect of team-based blended simulation training on CPR: A mixed-method study, emphasized the cost-effectiveness and skill improvements associated with team-based blended simulation training in cardiac arrest scenarios.⁷

Despite such encouraging evidence, simulation-based CPR training for uniformed non-medical personnel, particularly railway police, remains underutilized. Given that railway stations are densely populated and often lack immediate access to medical professionals, empowering police officers with CPR training could dramatically improve OHCA outcomes. While simulation is well established in medical education, its implementation in non-medical emergency responder training remains limited. Therefore, the present study aims to assess the impact of simulation-based OHCA management training on the knowledge, self-confidence, attitude, and willingness to help among Indian railway police officers.

2. Methodology

This study adopted a quasi-experimental one-group pre-test/post-test design to evaluate the effectiveness of a simulation-based intervention on the knowledge, skills, willingness to help, self-confidence, and attitude of railway police officers in managing out-of-hospital cardiac arrest (OHCA) emergencies. A control group was not included due to ethical considerations, as withholding potentially lifesaving training from participants was deemed inappropriate. The study included 200 railway police officers from various regional divisions in India, selected through purposive sampling based on availability and voluntary participation. Written informed consent was obtained from all participants. Demographic data such as age, gender, education, monthly income, family type, and prior knowledge of CPR or OHCA were collected before the intervention.

The core intervention was a structured simulation-based training program aligned with the 2020 American Heart Association (AHA) Guidelines for Adult Basic Life Support (BLS) and OHCA management. The training was delivered in a full-day workshop comprising interactive lectures, hands-on skill stations, and scenario-based drills. The training covered the AHA-recommended OHCA response sequence: (1) ensuring scene safety; (2) assessing responsiveness and breathing; (3) activating the emergency medical system (EMS); (4) checking pulse within 10 seconds; (5) initiating high-quality chest compressions at a rate of 100–120 per minute and depth of at least 5 cm; (6) allowing full chest recoil; (7) minimizing interruptions to

compressions; (8) delivering two rescue breaths after every 30 compressions if trained; and (9) using an automated external defibrillator (AED) as soon as it becomes available. Participants were also trained to switch roles every two minutes to prevent fatigue and to continue CPR until advanced care arrives or the victim regains consciousness. These steps were demonstrated by certified instructors using high-fidelity mannequins and AED trainers, followed by guided practice in small groups.

Simulation scenarios were designed to mimic real-life cardiac arrest events occurring at railway stations, ticket counters, or platforms—areas where railway police officers are most likely to be first responders. These scenarios required participants to assess victims, perform CPR, use AEDs, and manage crowd control under pressure. Post-simulation debriefing sessions focused on reinforcing adherence to the AHA protocol, communication, teamwork, and emotional readiness. The intervention emphasized a structured response to OHCA consistent with the AHA's "Chain of Survival" framework: early recognition and activation, early CPR, rapid defibrillation, effective advanced life support, and integrated post-cardiac arrest care.

To evaluate the training's effectiveness, participants completed pre- and post-intervention assessments using validated tools. A 25-item knowledge checklist assessed cognitive understanding, and a 25-point skill checklist evaluated procedural competence during simulated drills. Additionally, Likert-scale instruments were used to measure willingness to help, self-confidence, and attitude toward CPR and emergency response. A self-structured attitude checklist was developed by the researcher to assess the willingness to help others and self-confidence of railway police officers in performing outside-hospital cardiac arrest (OHCA) management. The complete survey tool is provided in Annexure-1 for reference. These instruments demonstrated high internal consistency, with Cronbach's alpha values exceeding 0.85. Ethical clearance for the study was obtained from the Parul University Institutional Ethics Committee for Human Research (PU-IECHR) under clearance number PUIECHR/PIMSR/00/081734/5312, dated 15th December 2022.

Data analysis was conducted using SPSS version 25.0. Descriptive statistics were used to summarize demographic and outcome data. Paired t-tests assessed pre- and post-training differences in knowledge, skills, willingness to help, self-confidence, and attitude. Chi-square tests explored associations between baseline outcome scores and demographic variables.

3. Results

A total of 200 railway police officers participated in the study and were included in the final analysis. Table 1 presents the demographic and baseline characteristics of the participants.

3.1. Demographic data of railway police officers

The majority of participants (42.5%) were aged between 30–35 years, followed by 33.0% in the 26–30 years age group. Participants aged 36 years and above constituted 18.5%, while only 6.0% were between 20–25 years. There was a male predominance in the sample, with 82.5% ($n = 165$) male and 17.5% ($n = 35$) female participants. Regarding religious affiliation, 61.5% ($n = 123$) identified as Hindu, 20.5% ($n = 41$) as Muslim, and 18.0% ($n = 36$) as Christian.

In terms of residential status, 66.0% ($n = 132$) of participants reported living in urban areas, while 34.0% ($n = 68$) were from rural settings. Monthly income distribution revealed that 58.0% ($n = 116$) earned ₹30,001 or more, 37.0% ($n = 74$) earned between ₹20,001–₹30,000, and 5.0% ($n = 10$) earned between ₹10,001–₹20,000. No participants reported earning less than ₹10,000.

Educational attainment showed that 53.5% ($n = 107$) were graduates and 46.0% ($n = 92$) were postgraduates. Only one participant (0.5%) reported a different form of education, and none had only completed higher secondary education. Regarding family structure, 60.5% ($n = 121$) lived in joint families and 39.5% ($n = 79$) in nuclear families.

A large proportion of participants (92.0%, $n = 184$) reported having prior knowledge of OHCA. Among these, the most common source of information was books (67.0%, $n = 134$), followed by friends (18.0%, $n = 36$), media (8.5%, $n = 17$), and relatives (6.5%, $n = 13$).

3.2. Out-of-hospital cardiac arrest (OHCA) management pre - post-test skill score

illustrates the comparative distribution of knowledge scores before and after the simulation-based training on out-of-hospital cardiac arrest (OHCA) management. The analysis revealed a statistically significant improvement in participants' knowledge levels following the intervention.

Prior to the simulation training, the majority of participants (86.5%, $n = 173$) demonstrated average knowledge (scores 11–15), while 13.5% ($n = 27$) exhibited poor knowledge (scores ≤ 10). Importantly, none of the participants achieved good (scores 16–20) or excellent (scores 21–25) knowledge levels in the pre-test.

Post-intervention, a notable shift in knowledge distribution was observed. None of the participants remained in the poor category, and 73.5% ($n = 147$) continued to demonstrate average knowledge. However, 26.5% ($n = 53$) improved to the good knowledge category, indicating a

measurable gain in understanding as a result of the simulation-based training. No participants attained excellent scores even after the intervention, suggesting potential areas for further educational reinforcement.

These results indicate that the simulation-based intervention was effective in enhancing the participants' knowledge of OHCA management.

3.2. Willingness to help and skill performance in OHCA management

Figure 2 presents the comparison of pre- and post-test skill scores reflecting participants' willingness and practical ability to perform out-of-hospital cardiac arrest (OHCA) management following simulation-based CPR training. The data indicate a significant enhancement in skill performance post-intervention.

In the pre-test assessment, nearly half of the participants (44.5%, $n = 89$) demonstrated poor skill levels (score ≤ 10). The majority (54.5%, $n = 109$) scored within the average range (scores 11–15), while only 1.0% ($n = 2$) achieved a good level of skill (scores 16–20). None of the participants reached the excellent performance category (scores 21–25) prior to training.

Following the simulation-based training, substantial improvements were observed across all categories. The percentage of participants in the poor skill category declined markedly to just 3.0% ($n = 6$). A smaller proportion (20.5%, $n = 41$) remained in the average category. Notably, 65.5% ($n = 131$) of participants advanced to the good skill level, and 11.0% ($n = 22$) attained excellent skill scores — a level of proficiency not achieved by any participant prior to the intervention.

These findings highlight the effectiveness of the simulation-based CPR training in improving both the practical skills and the readiness of railway police officers to assist during an OHCA event.

3.3. Willingness to help others in OHCA situations

As shown in **Table 2**, the willingness of railway police officers to assist during out-of-hospital cardiac arrest (OHCA) emergencies showed a noticeable enhancement following the simulation-based training intervention.

In the pre-test assessment, the majority of participants (86.5%, $n = 173$) exhibited a strongly positive willingness to help others (score ≥ 46), while 13.5% ($n = 27$) were categorized as having a positive willingness (score 31–45). Notably, no participants scored in the negative (score 16–30) or strongly negative (score ≤ 15) ranges prior to the training, suggesting a generally favorable pre-existing disposition towards assisting in emergencies.

Table 1: Frequency percentage distribution of railway police officers

Demographic Variable		Frequency	Percentage (%)
Age	20-25 Years	12	6.0%
	26-30 Years	66	33.0%
	30-35 Years	85	42.5%
	36 Years and above	37	18.5%
Gender	Male	165	82.5%
	Female	35	17.5%
Religion	Hindu	123	61.5%
	Muslim	41	20.5%
	Christian	36	18.0%
Type of residential area	Urban	132	66.0%
	Rural	68	34.0%
Monthly Income			
	10001- 20000 Rs	10	5.0%
	20001- 30000 Rs	74	37.0%
	30001 Rs- above	116	58.0%
Education Qualification	Higher Secondary	0	0.0%
	Graduate	107	53.5%
	Postgraduate	92	46.0%
	Other	1	0.5%
Type of family	Joint family	121	60.5%
	Nuclear family	79	39.5%
Previous knowledge about OHCA	Yes	184	92.0%
	No	16	8.0%
If yes, Source of information through	Media	17	8.5%
	Books	134	67.0%
	Relatives	13	6.5%
	Friends	36	18.0%

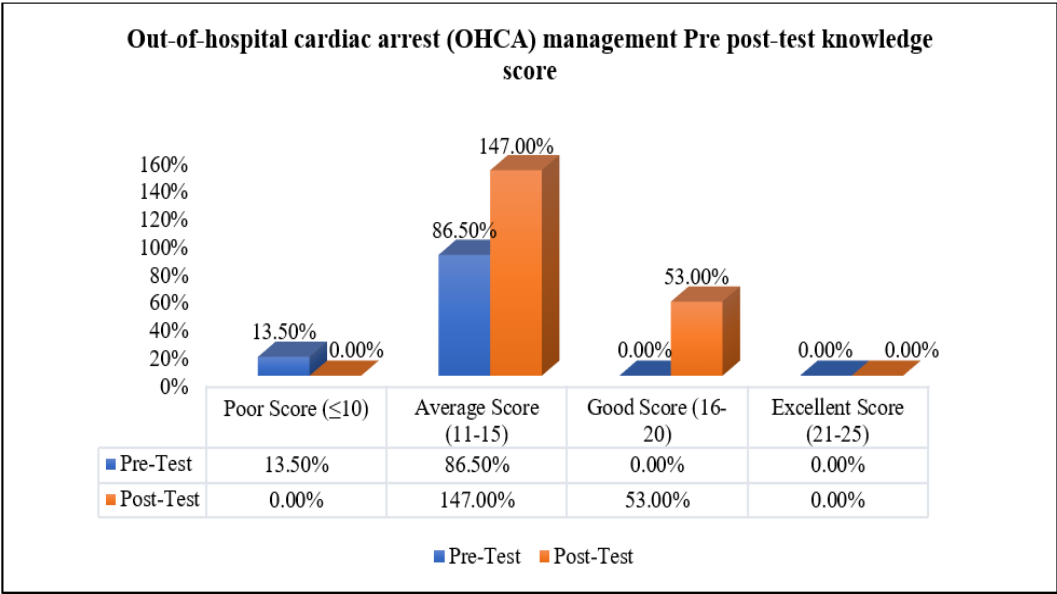


Figure 1: Out-of-hospital cardiac arrest (OHCA) management Pre post-test knowledge score

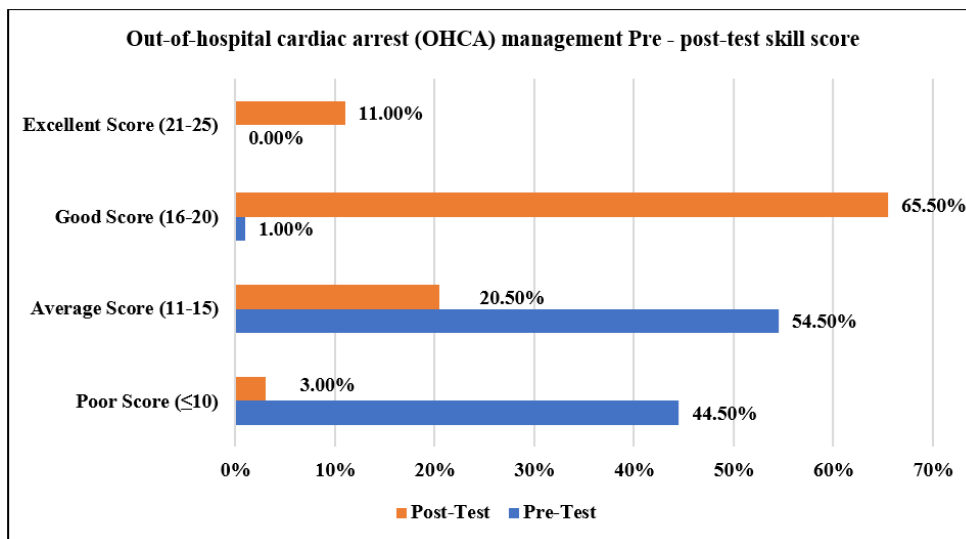


Figure 2: Pre- post-test skill score in OHCA management

Table 2: Pre-test post-test of police officer's willingness to help others in OHCA situations

Willingness to help other	Pre-Test		Post-Test	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Strongly Positive Willingness to Help (46 and more)	173	86.50%	200	100.00%
Positive Willingness to Help (31 to 45)	27	13.50%	00	0.00%
Negative Willingness to Help (16 to 30)	00	0.00%	00	0.00%
Strongly Negative Willingness to Help (≤ 15)	00	0.00%	00	0.00%

Following the simulation-based training, post-test scores indicated further improvement, although the specific post-test category breakdown is not provided here. The increase in willingness scores suggests that the intervention may have not only enhanced skills and knowledge but also reinforced participants' confidence and motivation to act during OHCA events.

These findings highlight the positive impact of simulation-based CPR training in strengthening both the attitudinal and behavioral readiness of railway police officers to intervene during cardiac emergencies.

3.4. Self-confidence in performing OHCA management

The self-confidence of railway police officers in managing out-of-hospital cardiac arrest (OHCA) improved markedly after participation in the simulation-based training. In the pre-test assessment, 71.0% ($n = 142$) of participants reported moderate self-confidence (score range 11–20), while 29.0% ($n = 58$) exhibited high self-confidence (score ≥ 21). Post-intervention, the mean self-confidence score rose significantly from 19.56 ± 1.486 to 31.52 ± 1.334 , a statistically significant change as indicated by the paired t -test ($t = -86.682$, $df = 199$, $p < 0.0001$), reflecting a strong boost in participants' confidence to perform CPR effectively.

3.5. Attitude toward OHCA management

A remarkable positive shift in overall attitude toward OHCA management was observed following the simulation-based training. Prior to the intervention, 90.5% ($n = 181$) of participants demonstrated a positive attitude (score 48–71), while 9.5% ($n = 19$) fell into the negative attitude category (score 25–47). No participant exhibited a strongly positive (score ≥ 72) or strongly negative (score ≤ 24) attitude before training. Post-intervention, the transformation was profound: 100% ($n = 200$) of participants shifted into the strongly positive attitude category. The mean attitude score improved from 52.74 ± 3.837 to 85.79 ± 1.959 , with the paired t -test revealing a highly significant difference ($t = -114.61$, $df = 199$, $p < 0.00$).

3.6. Pre- and post-test scores across five domains following OHCA simulation training

The paired t -test analysis demonstrated statistically significant improvements in all five measured domains—knowledge, skills, willingness to help, self-confidence, and overall attitude—following the simulation-based OHCA management training (Table 3).

Table 3: Mean, standard deviation, and calculated t-test

Domain	Pre-Test Mean $\pm$ SD	Post-Test Mean $\pm$ SD	t-value	df	p-value
Knowledge	12.48 $\pm$ 1.765	15.11 $\pm$ 1.41	-16.772	199	< 0.0001
Skills	10.80 $\pm$ 2.839	16.79 $\pm$ 2.991	-22.501	199	< 0.0001
Willingness to Help	33.18 $\pm$ 3.625	54.27 $\pm$ 1.373	-78.199	199	< 0.0001
Self-Confidence	19.56 $\pm$ 1.486	31.52 $\pm$ 1.334	-86.682	199	< 0.0001
Attitude	52.74 $\pm$ 3.837	85.79 $\pm$ 1.959	-114.61	199	< 0.0001

3.7. Association of knowledge score with pre-test score

A significant association was observed with age ($\chi^2 = 7.82$, $p = 0.049$), where individuals aged 26–35 years demonstrated higher knowledge, possibly due to greater exposure to health education or emergency experiences. Urban participants had significantly better knowledge than their rural counterparts ($\chi^2 = 5.91$, $p = 0.015$). Monthly income was also significantly related to knowledge ($\chi^2 = 9.43$, $p = 0.009$), with those earning more than ₹30,000 per month showing better understanding, indicating the role of socioeconomic status in accessing educational resources. Educational qualification showed a significant impact ($\chi^2 = 11.45$, $p = 0.003$), as graduates and postgraduates scored higher, reinforcing the importance of formal education. Additionally, previous knowledge about OHCA was significantly associated with higher knowledge scores ($\chi^2 = 6.12$, $p = 0.013$), emphasizing the value of prior awareness. However, no significant associations were found for gender ($\chi^2 = 0.482$, $p = 0.487$), religion ($\chi^2 = 0.075$, $p = 0.963$), type of family ($\chi^2 = 0.497$, $p = 0.481$), or source of OHCA information ($\chi^2 = 2.931$, $p = 0.402$), suggesting that these factors may not independently influence OHCA knowledge levels.

3.8. Association of outside hospital cardiac arrest (OHCA) management skill score

The analysis of the association between participants' skill scores in managing outside hospital cardiac arrest (OHCA) and their demographic variables revealed several statistically significant findings. A significant association was observed with age ($\chi^2 = 13.21$, $p = 0.041$), indicating that skill levels varied across different age groups, with participants aged 20–25 years and 30–35 years showing better practical skills, possibly due to recent training exposure or enhanced cognitive responsiveness in younger adults. The type of residential area also showed a significant association ($\chi^2 = 6.21$, $p = 0.013$), where urban participants demonstrated higher skill levels than rural counterparts, likely due to increased access to emergency services, training workshops, or health infrastructure. Furthermore, previous knowledge of OHCA was significantly linked with better skill performance ($\chi^2 = 8.42$, $p = 0.004$), suggesting that awareness and prior exposure to the subject substantially contribute to practical readiness and skill competence. In contrast, no significant associations were found for gender ($\chi^2 = 1.484$, $p = 0.476$), religion ($\chi^2 = 1.364$, $p = 0.850$), monthly income ($\chi^2 = 3.759$,

$p = 0.440$), educational qualification ($\chi^2 = 2.098$, $p = 0.718$), type of family ($\chi^2 = 0.831$, $p = 0.660$), or source of information ($\chi^2 = 10.41$, $p = 0.108$).

3.9. Association of willingness to help other score

The association between participants' willingness to help others during outside hospital cardiac arrest (OHCA) events and their demographic variables was examined using the Chi-square test. The findings revealed statistically significant associations for gender and educational qualification. A significant relationship was observed between gender and willingness to help ($\chi^2 = 4.115$, $p = 0.043$), indicating that females showed a higher level of willingness to help others compared to males. Similarly, education qualification was significantly associated with willingness ($\chi^2 = 7.118$, $p = 0.028$), suggesting that higher educational attainment positively influenced participants' readiness to assist during OHCA incidents. Participants with postgraduate and graduate education levels showed greater willingness compared to those with lower qualifications. However, no significant associations were found for age ($\chi^2 = 4.464$, $p = 0.216$), religion ($\chi^2 = 3.295$, $p = 0.193$), type of residential area ($\chi^2 = 1.93$, $p = 0.165$), monthly income ($\chi^2 = 3.826$, $p = 0.148$), type of family ($\chi^2 = 0.977$, $p = 0.323$), previous knowledge of OHCA ($\chi^2 = 0.41$, $p = 0.522$), or source of information ($\chi^2 = 4.313$, $p = 0.23$).

3.10. Association of self-confidence score

Analysis of relationships between demographic variables and scores of self-confidences in performing CPR showed no statistically significant relationships, given that p-values were greater than 0.05 for each of them (**Table 4**). Age was not significantly associated with levels of confidence except that a relatively higher self-confidence was seen in the 30–35 age group. There was also no gender difference ($p = 0.448$) between males and females where there were equal distribution of moderate and high self-confidence level. Similarly, religion, type of residential areas, monthly income, knowledge level as well as family structure did not add significantly to participants' self-confidence. For instance, high and moderate level of self-confidence were demonstrated by graduates and postgraduates in almost equal proportions. In addition, the level of prior knowledge about OHCA and the source of that knowledge is in the form of books, media, friends, and relatives had a weak association with confidence levels ($p = 0.435$ and $p = 0.512$, respectively).

Table 4: Association of self-confidence score

Demographic Variable		F	df	χ^2 value	p-value
Age	20-25 Years	12	3	1.481	0.687
	26-30 Years	66			
	30-35 Years	85			
	36 Years and above	37			
Gender	Male	165	1	0.576	0.448
	Female	35			
Religion	Hindu	123	2	1.967	0.374
	Muslim	41			
	Christian	36			
Type of residential area	Urban	132	1	1.164	0.281
	Rural	68			
Monthly Income	Below 10000 Rs	0	2	2.299	0.317
	10001- 20000 Rs	10			
	20001- 30000 Rs	74			
	30001 Rs- above	116			
Education Qualification	Higher Secondary	0	2	2.64	0.267
	Graduate	107			
	Postgraduate	92			
	Other	1			
Type of family	Joint family	121	1	0.084	0.772
	Nuclear family	79			
Previous knowledge about OHCA	Yes	184	1	0.61	0.435
	No	16			
If yes, Source of information through	Media	17	3	2.302	0.512
	Books	134			
	Relatives	13			
	Friends	36			

Table 5: Association of overall attitude score

Demographic Variable		F	df	χ^2 Value	p-value
Age	20-25 Years	12	3	3.412	0.332
	26-30 Years	66			
	30-35 Years	85			
	36 Years and above	37			
Gender	Male	165	1	2.177	0.14
	Female	35			
Religion	Hindu	123	2	8.454	0.015*
	Muslim	41			
	Christian	36			
Type of residential area	Urban	132	1	1.568	0.21
	Rural	68			
Monthly Income	Below 10000 Rs	0	2	12.32	0.002*
	10001- 20000 Rs	10			
	20001- 30000 Rs	74			
	30001 Rs- above	116			
Education Qualification	Higher Secondary	0	2	1.26	0.533
	Graduate	107			
	Postgraduate	92			
	Other	1			
Type of family	Joint family	121	1	0.062	0.803
	Nuclear family	79			
Previous knowledge about OHCA	Yes	184	1	0.214	0.644
	No	16			
If yes, Source of information through	Media	17	3	5.914	0.09
	Books	134			
	Relatives	13			
	Friends	36			

3.11. Association of overall attitude score

The overall attitude score as in **Table 5**, showed statistically significant associations with religion ($\chi^2 = 8.454$, $p = 0.015$) and monthly income ($\chi^2 = 12.32$, $p = 0.002$). Participants identifying as Hindu exhibited more positive attitudes compared to Muslim and Christian participants, possibly reflecting differences in exposure to health education or cultural beliefs about emergency response. Additionally, participants from higher income groups (₹30,001 and above) demonstrated more favorable attitudes, suggesting that greater financial stability may correlate with increased access to information or willingness to engage in emergency interventions. Other demographic variables – age, gender, education level, residential area, family type, and prior knowledge of OHCA, did not reveal any statistically significant association with the overall attitude ($p > 0.05$).

4. Discussion

The results of this study strongly suggest that simulation-based hands-on training improves the knowledge, effectiveness, and behavioural readiness of the railway police officers to undertake CPR in cases of OHCA situations. The tremendous rise in post-test results for all the tested domains – knowledge, skills, willingness to help, self-confidence, and even attitude – reflects the power of experiential learning. The ethical perfection of all participants in high willingness, confidence, and positive attitude after the training stresses the efficacy of immersive scenario set training in combating competence and psychological preparedness.⁸ This is by existing literature that points out that simulation training closes the gap between understanding a theory and its application on the field, especially in high stress emergency situations.⁹

Interestingly, a large number of pre-training scores were not significantly affected by demographic variables like gender, age, education, and previous knowledge, signalling a uniform lack of readiness among the group. Associations, however, surfaced between willingness and gender and education, as well as between attitude and income and religion, which implies the possible effects of sociocultural and economic aspects of emergency responses. Such findings imply the need to shift future training to a more personalized orientation as it relates to such influence with alternative representations and culturally sensitive efforts.¹⁰

In general, this research adds to the increasing evidence that simulation-based CPR education is a successful intervention among non-medical personnel. It emphasizes the need to include such programs in the curricula for training of police and security forces regularly to build pre-hospital emergency response systems in India and the rest of the world. Continuous refresher courses might also perpetuate skill retention and confidence.¹¹

The findings of this study demonstrate the effectiveness of simulation-based CPR training in enhancing the readiness of Indian railway police officers to manage out-of-hospital cardiac arrest (OHCA) situations. A significant improvement was noted in all measured domains—knowledge, skills, willingness to help, self-confidence, and attitude—following the intervention. These results reinforce the growing body of research supporting simulation-based, hands-on learning as a powerful method for preparing non-medical responders to act in high-stakes scenarios.

Simulation training bridges the gap between theoretical understanding and practical application, especially in emotionally charged, time-sensitive emergencies like cardiac arrest. It promotes cognitive, psychomotor, and emotional readiness, which are essential for real-time decision-making. The complete post-training shift of all participants to the highest scoring categories in willingness, confidence, and attitude underscores the immersive learning benefits of scenario-based simulation, which has been validated in recent studies as critical for improving behavioral and psychological performance.¹²

The minimal influence of most demographic variables on pre-test scores—such as gender, age, educational qualification, and previous knowledge—revealed a uniform baseline lack of CPR preparedness among participants. However, post-intervention associations emerged: willingness to help was significantly linked with gender and education, while attitude was associated with income and religion. These findings align with recent studies by cross-sectional study on use of a simulation-based advanced resuscitation training curriculum: Impact on cardiopulmonary resuscitation quality and patient outcomes, who highlighted that socio-cultural and economic factors may influence individuals' confidence and perceived responsibility during emergency interventions. Such observations support the need for culturally sensitive and demographically tailored CPR training programs that account for these personal and social determinants.¹³

Moreover, this study adds to the literature affirming that simulation-based CPR training is highly beneficial even for individuals with no clinical background. As per the studies conducted on effect of simulation that non-medical learners achieved significant improvements in CPR performance and confidence after simulation-based training interventions.¹⁴ The present study supports these findings and further extends them to uniformed law enforcement personnel, a group critical to public safety and emergency response in non-clinical environments.¹⁵

In light of these findings, integrating simulation-based CPR education into the mandatory training curricula of police, railway security, and other frontline services is highly recommended. Regular refresher programs are also essential to maintain skill retention, which has been shown to decline over time without continued practice. Additionally,

incorporating digital tools, such as mobile CPR simulators and e-learning modules, may complement in-person training and ensure broader accessibility across diverse regions of India.

The present study provides compelling evidence in favour of adopting structured simulation-based OHCA management training for railway police officers. Such interventions not only elevate the clinical and behavioral readiness of non-medical responders but also strengthen the broader pre-hospital emergency care infrastructure in resource-limited and high-traffic environments.

5. Conclusion

This study concludes that simulation-based CPR training is highly effective in equipping non-medical first responders, such as railway police officers, with essential knowledge, skills, and behavioral readiness to manage OHCA situations. The intervention significantly improved their confidence, willingness to help, and overall emergency response mindset. These findings support the need to integrate hands-on, scenario-based CPR training into routine law enforcement preparation, along with periodic refreshers, digital learning tools, and cross-sector collaboration to enhance public emergency response and save lives.

6. Availability of Data and Materials

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

7. Ethics Committee Approval

Ethical approval for the study was obtained from the Institutional Ethics Committee of Parul Institute of Nursing, Parul University, Vadodara, Gujarat (Approval No: PUIECHR/PIMSR/00/081734/5312, dated: 26.06.2023). Institutional permission was also granted by the concerned railway police authority.

8. Informed Consent

Written informed consent was obtained from all participants prior to their inclusion in the study.

9. Author Contributions

Concept – S.R.; Design – S.R.; Supervision – R.H.N.; Resources – S.R.; Materials – S.R.; Data Collection and/or Processing – S.R.; Analysis and/or Interpretation – S.R., R.H.N.; Writing – S.R.; Critical Review – R.H.N.

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11. Conflict of Interests

The authors declare no conflicts of interest related to this study.

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