



Original Article

Outcome Of Near Hanging – A Prospective Observational Study In A Tertiary Care Centre

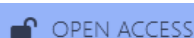
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ABSTRACT

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Background: Near-hanging is a critical medical emergency with potential for severe neurological and systemic complications. Early assessment and intervention are crucial in determining outcomes.

Objectives: To evaluate the clinical profile, management, and outcomes of patients presenting with near-hanging to a tertiary care center.

Materials and Methods: This prospective observational study included 100 patients aged >12 years who presented within 6 hours of a hanging incident to the Emergency Department of Government Villupuram Medical College, Tamil Nadu, India, from November 2023 to November 2024. Demographic data, clinical findings, investigations, and outcomes were recorded. Severity was assessed using the Glasgow Coma Scale (GCS) and Simplified Acute Physiology Score II (SAPS II).

Results: The mean age of participants was 41.9 ± 15.4 years, with 59% males. Ligature marks were observed in 96% of cases. The mean time to first medical contact was 39.1 ± 17.4 minutes. Low GCS at admission and prolonged hanging duration were associated with poor outcomes. Overall, 67% of patients survived with full recovery, while 12% died and 21% had neurological or psychiatric sequelae. Mechanical ventilation was required in 22% of patients on day 1, with gradual improvement over 10 days.

Conclusion: Near-hanging carries significant risk of mortality and neurological complications. Early emergency intervention, prompt airway and physiological management, and close monitoring improve survival and reduce adverse outcomes. Public awareness and psychiatric evaluation are essential for prevention and long-term care.

Keywords: Near-hanging, Glasgow Coma Scale, SAPS II, mortality, neurological outcome, emergency care.

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INTRODUCTION

Suicide is a significant public health issue worldwide, and in India, hanging is among the most common methods of deliberate self-harm [1,2]. The prevalence of suicide by hanging in low- and middle-income countries has been attributed to the easy accessibility of materials such as ropes, belts, and wires, as well as socio-cultural factors, including family stressors, financial hardship, and psychiatric illness [1,3]. Near-hanging—defined as survival after a hanging attempt long enough to receive medical attention—is a medical emergency with a wide range of potential outcomes, from complete neurological recovery to severe deficits or death [3,4].

The pathophysiology of near-hanging involves multiple mechanisms. Cerebral hypoxia resulting from vascular compression, jugular vein obstruction, and airway compromise leads to neuronal injury and can precipitate seizures, coma, or permanent neurological deficits [5,6]. Secondary complications, such as pulmonary edema, aspiration pneumonia, laryngeal trauma, and cardiovascular instability, further contribute to morbidity and mortality [6,7]. Early

recognition and aggressive resuscitative measures—including airway management, hemodynamic stabilization, oxygen supplementation, and neuroprotection—are critical for improving patient outcomes [2,5,8].

Predictors of poor outcomes in near-hanging patients identified in previous studies include low Glasgow Coma Scale (GCS) at presentation, hypotension, cardiac arrest, aspiration pneumonia, prolonged hanging duration, and delayed hospital arrival [3,4,7]. Conversely, early medical intervention, shorter duration of hanging, and higher GCS scores are associated with improved survival and neurological recovery [3,9]. In addition, physiological severity scores such as the Simplified Acute Physiology Score II (SAPS II) have been used to predict outcomes and guide management in critically ill patients [8,9].

Despite the clinical significance of near-hanging, there is limited prospective data from Indian tertiary care centers evaluating patient demographics, clinical presentation, severity scores, and outcomes. Most studies in India have been retrospective or single-center audits, limiting their generalizability [4,5].

In this prospective observational study, 100 patients presenting within six hours of near-hanging to the Emergency Department of Government Villupuram Medical College were evaluated. The mean age was 41.9 ± 15.36 years, and 59% were male. GCS at admission ranged from 5 to 13, with 42% of patients having an APS ≥ 40 . The majority of patients (67%) survived with full recovery, while 12% succumbed, and 21% experienced neurological or psychological sequelae, including persistent vegetative state, cognitive impairment, post-traumatic stress disorder (PTSD), depression, and residual quadriplegia. This study provides a detailed assessment of the clinical spectrum, management, and outcomes of near-hanging patients in a tertiary care setting, with the aim of guiding early risk stratification and interventions.

MATERIALS AND METHODS

Study Design

This was a **prospective observational study** conducted to evaluate the clinical profile and outcomes of patients presenting with near hanging.

Study Setting

The study was conducted in the **Department of Emergency Medicine**, Government Villupuram Medical College, Villupuram, Tamil Nadu, India.

Study Period

The study was carried out over a period of **one year**, from **November 2023 to November 2024**.

Study Population

The study population comprised patients who presented to the Department of Emergency Medicine within **6 hours of a hanging incident**.

Inclusion Criteria

- Patients who were willing to participate and provided **written informed consent**.
- Patients aged **>12 years**, of **both genders**.
- Patients who presented within **6 hours of the index event**.

Exclusion Criteria

- Patients with known **comorbidities** such as **chronic kidney disease (CKD)** or **dilated cardiomyopathy (DCM)**.
- Patients with **terminal illnesses** (e.g., malignancy).
- Patients who had used **other suicidal measures** (such as poisoning) concurrently.
- **Pregnant patients**.

Sample Size

The sample size was calculated based on the study conducted by **De Charentenay et al.** using the formula:

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

Where:

- $Z_{1-\alpha/2} = 1.96$ at 95% confidence interval
- $p = 43.4\%$ (prevalence from reference study)
- $q = 100 - p = 56.6$
- $d = 11$ (absolute precision)

$$n = \frac{(1.96)^2 \times 43.4 \times 56.6}{11^2} = \frac{9808.4}{121} = 81.06$$

Adding a **10% non-response rate**, the final sample size was rounded to **100 participants**.

Sampling Frame

The sampling frame was obtained from the **Emergency Department registry** maintained at Government Villupuram Medical College. All patients with a history of hanging who met the inclusion criteria were identified from this registry.

Sampling Method

A **simple random sampling** technique was used. A random number table was employed to select eligible participants from the sampling frame. The selected participants were enrolled and followed up for outcome assessment.

Data Collection Tool

Data were collected using a **structured questionnaire** designed based on previous literature. The questionnaire included the following sections:

- Basic demographic details of participants
- History and circumstances of hanging
- Clinical parameters and investigation findings
- Acute illness severity, assessed using the **Simplified Acute Physiology Score II (SAPS II)**

Data Collection Procedure

- Prior approval was obtained from the **Institutional Ethics Committee (IEC)** of Government Villupuram Medical College.
- Eligible participants were selected by simple random sampling.
- The study purpose was explained to each participant, and **written informed consent** was obtained.
- Data were collected through **face-to-face interviews** using the structured questionnaire.
- Each question was read verbatim in the same order for all participants, and adequate time was provided for responses.
- In case of comprehension difficulty, questions were repeated in the same manner without leading or prompting the respondent.

Operational Definition

Following the collection of basic demographic data, history of hanging, and vital signs, each participant underwent a **detailed physical examination and relevant investigations** performed by an **Emergency Physician**. All assessments were carried out in the Emergency Department without interfering with the patient's ongoing management.

Assessment of Acute Physiological Score

The **Simplified Acute Physiology Score II (SAPS II)** was used to evaluate the severity of illness and predict clinical outcomes.

RESULTS AND OBSERVATIONS;

Table:1 Age and Sex Distribution of Study Participants

Variable	Category	Frequency	Proportion (%)	Mean $\pm$ SD
Age (in Years)	—	—	—	41.90 $\pm$ 15.36
Sex	Male	59	59.0	—
	Female	41	41.0	—
Total Participants	—	100	100%	—

Table: 2 Comorbidities of study participants:

Comorbidities	Frequency	Proportion	Total
CAD	6	6.0	100(100%)
DM	43	43.0	
DM & HT	3	3	
HT	39	39	
HT & CAD	8	8	
Malignancy	1	1.0	

Table:3 Hanging Duration of study participants:

Hanging Duration (Mins)	Frequency	Proportion	Total
1	2	2.0	100(100%)
2	10	10.0	
3	13	13.0	
4	19	19.0	
5	22	22.0	

6	24	24.0	
7	4	4.0	
Unknown time	6	6.0	
11	1	1.0	

Table: 4 Material Type of study participants:

Material Type	Frequency	Proportion	Total
Belt	12	12.0	100(100%)
Cloth	38	38.0	
Electric Wire	18	18.0	
Rope	32	32.0	

Table: 5 Time to First Medical Contact (FMC) and Symptoms of Study Participants

Variable / Symptom	Mean / Frequency	SD / Proportion	Total
FMC (in minutes)	39.06	17.43	—
Coma	8	8.0%	100 (100%)
Decerebrate posture	1	1.0%	
Drowsy	12	12.0%	
Dyspnoea	12	12.0%	
Loss of Consciousness (LOC)	46	46.0%	
Seizure	19	19.0%	
Stupor	2	2.0%	

Table: 6 Clinical Examination Findings of Study Participants (N = 100)

Parameter	Category / Finding	Frequency	Proportion (%)
Ligature Mark	Present	96	96.0
	Absent	4	4.0
CVS Findings	Normal	83	83.0
	ESM murmur – aortic area	8	8.0
	S3 gallop	9	9.0
RS Findings	Normal	72	72.0
	Crackles	28	28.0

Table:7 P/A Findings, GCS at Admission, and Pupil Findings of Study Participants (N = 100)

Parameter	Category / Finding	Frequency	Proportion (%)
Per-Abdominal (P/A) Findings	Normal	100	100.0
GCS at Admission	GCS 5	32	32.0
	GCS 6	4	4.0
	GCS 7	41	41.0
	GCS 13	23	23.0
Pupil Findings	Normal	81	81.0
	Dilated, sluggishly reacting to light	19	19.0

Table:8 Examination Findings from Day 1 to Day 10 (N = 100)

Parameter	Day 1	Day 2–4 Trend	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
SBP (Normal %)	80%	↑ improving	96%	100%	100%	16%*	16%*	16%*
HR (Normal %)	84%	↑ improving	90%	100%	100%	16%*	16%*	16%*
RR (Normal %)	79%	↑ improving	85%	100%	100%	16%*	16%*	16%*
SpO ₂ Normal %	45%	Steady rise	72%	88%	88%	16%*	16%*	16%*
WBC Normal %	54%	Gradual rise	100%	100%	100%	16%*	16%*	16%*
Urea Normal %	97%	Stable	99%	99%	99%	16%*	16%*	16%*
Creatinine Normal %	92%	Stable	100%	100%	100%	16%*	16%*	16%*
Bilirubin Normal %	63%	Mild improvement	100%	100%	100%	16%*	16%*	16%*
SGOT Normal %	70%	Improving	100%	100%	100%	16%*	16%*	16%*
SGPT Normal %	100%	Normal	100%	100%	100%	16%*	16%*	16%*
Sodium Normal %	32%	Steady improvement	100%	100%	100%	16%*	16%*	16%*
Potassium Normal %	95%	Stable	100%	100%	100%	16%*	16%*	16%*
ABG Normal %	55%	↑ improving	73%	76%	86%	13%*	16%*	16%*

Table:9 Mechanical Ventilation & Steroid Use (Day 1–10)

Day		MV – No	MV – Yes	MV – Discharged	Steroid – No	Steroid – Yes	Total
Day 1		78	22	–	78	22	100
Day 2		88	12	–	NA	NA	100
Day 3		91	9	–	91	9	100
Day 4		94	6	–	94	6	100
Day 5		98	2	–	98	2	100
Day 6		100	0	–	100	0	100
Day 7	100	0	–	100	0	100	
Day 8	16	0	84	0	0	100	
Day 9	16	0	84	100	0	100	
Day 10	16	0	84	100	0	100	

Table: 10 GCS at Day 1 to Day 10

GCS	Day 1 (Admission)	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
5	32 (32%)	–	–	–	–	–	–	–	–	–
6	4 (4%)	2 (2%)	–	–	–	–	–	–	–	–
7	41 (41%)	5 (5%)	5 (5%)	2 (2%)	1 (1%)	–	–	–	–	–
8	–	5 (5%)	5 (5%)	4 (4%)	1 (1%)	–	–	–	–	–
9	–	18 (18%)	18 (18%)	9 (9%)	4 (4%)	2 (2%)	–	–	2 (2%)	–
10	–	17 (17%)	17 (17%)	23 (23%)	8 (8%)	3 (3%)	–	–	–	–
11	–	20 (20%)	20 (20%)	23 (23%)	24 (24%)	8 (8%)	–	–	–	–
12	–	15 (15%)	15 (15%)	19 (19%)	23 (23%)	12 (12%)	–	–	–	–
13	23 (23%)	10 (10%)	10 (10%)	12 (12%)	22 (22%)	27 (27%)	7 (7%)	3 (3%)	–	–
14	–	5 (5%)	5 (5%)	5 (5%)	10 (10%)	30 (30%)	9 (9%)	7 (7%)	5 (5%)	–
15	–	3 (3%)	5 (5%)	3 (3%)	7 (7%)	18 (18%)	84 (84%)	6 (6%)	11 (11%)	16 (16%)
Discharged	–	–	–	–	–	–	–	84 (84%)	84 (84%)	84 (84%)

Table; 11 X-Ray Chest Findings (Day 1, Day 3, Day 5)

X-Ray Finding	Day 1	Day 3	Day 5
Normal	83	89	98
Pulmonary edema	17	–	–
Aspiration pneumonitis	–	11	–
Atelectasis	–	–	1
VAP / VAPP	–	–	1

Table: 12 Radiological & Clinical Features

Variable	Category	Frequency	Proportion (%)
X-Ray C-Spine	Normal	85	85.0
	Fracture C-spine	3	3.0
	Prevertebral soft tissue swelling (hematoma)	4	4.0
	Prevertebral soft tissue swelling (edema)	6	6.0
	Subluxation	2	2.0
X-Ray Neck	Normal	100	100.0
ICT	Absent	84	84.0
	Present	16	16.0
Anti-Edema Treatment	No	84	84.0
	Yes	16	16.0

Table:13 ECG of study participants:

Variables		Frequency	Proportion	Total
ECG	Normal	78	78.0	100(100%)
	Sinus tachycardia	17	17.0	
	VPC	5	5.0	

Table:14 Outcome & APS Score of Study Participants

Variable	Category	Frequency	Proportion (%)
Outcome	Death	12	12.0
	Depression	4	4.0
	Neurological sequelae – cognitive impairment	4	4.0
	Neurological sequelae – persistent vegetative state	4	4.0
	PTSD	6	6.0
	Sequelae of C-spine injury – residual quadriplegia	3	3.0
	Survival with full recovery	67	67.0
APS Score	≥40	42	42.0
	<40	58	58.0

DISCUSSION

Near-hanging is a critical emergency that poses significant challenges due to its variable clinical presentation and potential for severe neurological injury. In our study, males accounted for 59% of cases, consistent with prior literature suggesting a higher incidence of suicidal hanging among men, possibly due to greater exposure to stressors, impulsive behavior, and sociocultural norms favoring male dominance in high-risk occupations [1,2,7].

The mean age of 41.9 years in our cohort aligns with the reported peak incidence of near-hanging among middle-aged adults in India, reflecting the age group most susceptible to psychiatric stressors and socioeconomic challenges [3,4].

Survival with full recovery was observed in 67% of patients, while mortality was 12%. Additionally, 21% experienced neurological or psychological sequelae, including persistent vegetative state, cognitive impairment, PTSD, depression, and residual quadriplegia. These findings are comparable to previous Indian studies, which report survival rates between 60% and 70% in patients reaching tertiary care centers early [3,4,5].

Admission GCS was a significant predictor of outcome. Thirty-two percent of patients presented with GCS 5 and 41% with GCS 7. These results confirm earlier observations that low GCS at presentation is associated with higher mortality and poor neurological recovery, while higher GCS scores predict favorable outcomes [5,6,9]. Monitoring GCS over the first ten days, as in our study, provides valuable prognostic information, as patients with gradual improvement in GCS were more likely to survive with minimal deficits.

Physiological severity, measured by SAPS II, further correlated with outcomes. Forty-two percent of our patients had APS ≥40, which was associated with increased mortality and adverse neurological outcomes, reinforcing the predictive value of severity scoring systems in critically ill near-hanging patients [8,9].

Respiratory and cardiovascular complications were frequent in our cohort. Pulmonary edema (17%) and seizures (19%) were the most common early complications. Early airway management, oxygen supplementation, and monitoring for aspiration are crucial to minimize secondary brain injury and improve survival [2,4,6]. Radiological evaluation showed that cervical spine fractures were uncommon (3%), with prevertebral soft tissue swelling observed in 10% of cases. Although cervical spine injury is relatively rare in hanging, careful assessment is necessary to avoid exacerbating spinal trauma during resuscitation [5,7].

The mean time to first medical contact (FMC) was 39.06 ± 17.43 minutes, emphasizing the importance of rapid hospital presentation. Prompt intervention allows for early airway stabilization, correction of hypoxemia, hemodynamic support, and prevention of complications such as aspiration pneumonia or cerebral edema, all of which contribute to improved survival and neurological recovery [1,2,4].

Our study highlights several clinical implications. First, systematic assessment using GCS and APS scores is essential for triaging patients and identifying those at high risk of adverse outcomes. Second, early aggressive management—including airway, cardiovascular, and neurological support—can significantly improve survival. Third, continuous monitoring and follow-up are necessary to detect and manage neurological or psychological sequelae, which can impact long-term quality of life [3,5,9].

Overall, these findings underscore that near-hanging patients who present early and receive timely, structured care at a tertiary care center have a substantial likelihood of survival with good neurological recovery. This study adds valuable

prospective data to the Indian literature and provides guidance for risk stratification, resuscitation, and follow-up care in near-hanging patients.

CONCLUSION

Near-hanging is a life-threatening emergency with considerable morbidity and mortality. Early medical intervention, close monitoring, and supportive care significantly improve survival and neurological outcomes. Low GCS at admission, prolonged hanging duration, and delayed first medical contact were associated with poor outcomes. Timely emergency care and psychiatric evaluation are crucial for reducing complications and preventing recurrence.

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