"TO STUDY THE PROGNOSIS OF PATIENTS WITH INTRACEREBRAL BLEED USING INTRACEREBRAL HAEMORRHAGE (ICH) SCORE, ONE YEAR PROSPECTIVE OBSERVATIONAL STUDY AT TERTIARY CARE HOSPITAL, BELAGAVI"

BY

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With reference to the above, we wish to inform you that your proposed research project titled **"TO STUDY THE PROGNOSIS OF PATIENTS WITH INTRACEREBRAL BLEED USING ICH SCORE, ONE YEAR PROSPECTIVE OBSERVATIONAL STUDY AT TERTIARY CARE HOSPITAL, BELAGAVI",** is ethical and justifiable. The proposed research project has been cleared by the JNMC Institutional Ethics Committee.

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LIST OF ABBREVIATIONS

Sl. No.	Abbreviation	Full Form
1	ICH	Intracerebral Haemorrhage
2	GCS	Glasgow Coma Scale
3	IVH	Intraventricular Haemorrhage
4	CT	Computed Tomography
5	ROC	Receiver Operating Characteristic
6	CNS	Central Nervous System
7	MRI	Magnetic Resonance Imaging
8	BP	Blood Pressure
9	HR	Heart Rate
10	ICU	Intensive Care Unit
11	mRS	Modified Rankin Scale
12	NIHSS	National Institutes of Health Stroke Scale
13	SD	Standard Deviation
14	CI	Confidence Interval
15	OR	Odds Ratio
16	HR	Hazard Ratio
17	RR	Relative Risk
18	SPSS	Statistical Package for the Social Sciences

19	WHO	World Health Organization
20	HTN	Hypertension
21	DM	Diabetes Mellitus
22	CAD	Coronary Artery Disease
23	CVA	Cerebrovascular Accident
24	ED	Emergency Department
25	HbA1c	Glycated Haemoglobin
26	ASA	American Stroke Association
27	AIS	Acute Ischemic Stroke
28	IRB	Institutional Review Board
29	SDH	Subdural Hematoma
30	EDH	Epidural Hematoma
31	DVT	Deep Vein Thrombosis
32	APTT	Activated Partial Thromboplastin Time
33	INR	International Normalized Ratio
34	ECG	Electrocardiogram
35	CPR	Cardiopulmonary Resuscitation
36	ICD	International Classification of Diseases
37	TBI	Traumatic Brain Injury
38	SPB	Systolic Blood Pressure
39	DBP	Diastolic Blood Pressure

ABSTRACT

Background

Intracerebral haemorrhage (ICH) is a severe form of stroke characterized by bleeding into the brain parenchyma, leading to significant morbidity and mortality. The ICH score is a widely used prognostic tool that incorporates clinical and radiological factors such as the Glasgow Coma Scale (GCS), hematoma volume, age, intraventricular haemorrhage (IVH), and infratentorial origin to predict 30-day mortality. Although extensively validated in Western populations, its predictive accuracy in Indian settings, particularly in tertiary care hospitals, remains underexplored. This study evaluates the effectiveness of the ICH score in predicting mortality and functional outcomes in patients admitted to a tertiary care hospital in Belagavi, India.

Objectives

The primary objective of this study was to assess the prognosis of ICH patients using the ICH score and evaluate its predictive accuracy in determining 30-day mortality and functional outcomes. Secondary objectives included exploring the association between clinical and demographic characteristics and patient prognosis, identifying key predictors of mortality such as GCS score, hematoma size, IVH, and age, and investigating potential refinements in the scoring system or its application in specific populations.

Methods

This prospective observational cohort study was conducted at a tertiary care hospital in Belagavi from January 2023 to December 2023. A total of 73 adult patients

diagnosed with primary ICH were enrolled in the study. The ICH score was calculated based on clinical and radiological parameters at the time of admission. Patients were monitored throughout their hospital stay, and their outcomes were recorded. A 30-day post-admission follow-up was conducted to assess mortality and functional recovery, using phone calls if necessary. Statistical analysis was performed using descriptive and inferential methods, including chi-square tests, t-tests, regression analysis, and receiver operating characteristic (ROC) curve analysis to determine the predictive accuracy of the ICH score. Statistical significance was set at $p< 0.05$.

Results

The study findings demonstrated a strong correlation between higher ICH scores and increased mortality rates. Patients with ICH scores of 4 and 5 exhibited the highest mortality, whereas those with lower scores had significantly better survival rates. A lower GCS score at presentation was significantly associated with poorer outcomes, emphasizing its role as a critical determinant of prognosis. Hematoma volume also played a key role, with patients having hematoma volumes of 30 cm^3 or more experiencing significantly higher mortality than those with smaller hematomas. The presence of IVH was another crucial factor, as it was associated with increased mortality and poorer functional recovery. Similarly, infratentorial haemorrhages were linked to significantly worse outcomes. Among the comorbidities assessed, hypertension was found to be a significant predictor of poor prognosis, whereas diabetes, smoking, and alcohol consumption did not show a statistically significant impact on mortality.

Discussion

The results of this study reaffirm the reliability of the ICH score in predicting 30-day mortality and highlight its applicability in resource-limited healthcare settings. The findings align with previous studies that emphasize the prognostic value of the ICH score in stroke management. However, some variations were observed in outcomes among patients with moderate ICH scores (3 and 4), suggesting that additional predictive markers may enhance the accuracy of the scoring system. Future research should focus on incorporating novel biomarkers, imaging advancements, and individualized treatment strategies to refine prognostic models.

Conclusion

The ICH score remains a valuable and practical tool for predicting mortality in patients with ICH, particularly in resource-constrained settings where it aids in efficient patient stratification and resource allocation. The study supports its clinical utility in decision-making and underscores the need for continuous refinement of prognostic models to accommodate advances in treatment and management strategies.

Keywords

Intracerebral Haemorrhage, ICH Score, Stroke, Prognosis, Mortality, Glasgow Coma Scale, Hematoma Volume, Intraventricular Haemorrhage, Tertiary Care Hospital.

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INTRODUCTION

1.1 Background

Intracerebral hemorrhage (ICH) is a form of stroke characterized by bleeding directly into the brain tissue, which can cause significant neurological deficits and is often associated with high morbidity and mortality.[1,2] Globally, stroke is a leading cause of death and long-term disability, with ICH accounting for approximately 10-15% of all stroke cases.[3] However, despite its lower incidence compared to ischemic strokes, the prognosis of ICH is markedly worse, contributing disproportionately to the global burden of stroke.[1,3] The classification of ICH is based on the location of bleeding, such as lobar, deep, cerebellar, or brainstem hemorrhages, each carrying distinct clinical implications.

Prognosis in ICH remains a critical concern due to its high case fatality rate and significant long-term disability among survivors. Mortality rates range from 30% to 50% within the first 30 days, with many patients succumbing to early complications such as increased intracranial pressure and herniation.[4,5] Survivors often face chronic neurological impairments, requiring long-term care and rehabilitation. Predicting outcomes in ICH is inherently challenging due to the variability in clinical presentations, the complexity of underlying mechanisms, and limited resources for comprehensive evaluation in many healthcare settings.

1.2 The Problem Statement

The clinical management of ICH is fraught with challenges, particularly in resource-constrained settings like India. Accurate and timely prognosis plays a pivotal role in guiding treatment decisions, optimizing resource utilization, and providing

realistic expectations to patients and their families. However, existing prognostic tools often fall short due to their dependence on advanced imaging techniques or complex calculations, which are not always feasible in under-resourced environments.[3,7] This limitation underscores the need for a simple, reliable, and accessible prognostic model that can be universally applied. The lack of standardized, validated tools for predicting outcomes in ICH exacerbates the challenge, leading to suboptimal clinical decision-making and patient outcomes.

1.3 Importance of the Study

The Intracerebral Hemorrhage (ICH) Score is a well-established prognostic model that has gained recognition for its simplicity and effectiveness in predicting 30-day mortality in patients with ICH.[4] By incorporating key clinical and radiological parameters such as the Glasgow Coma Scale (GCS), hematoma size, location, age, and the presence of intraventricular hemorrhage, the ICH score provides a robust framework for assessing prognosis.[4] Its utility in clinical decision-making is particularly significant in resource-constrained settings, where advanced diagnostic tools may not be readily available.[8] In developing countries like India, where the burden of ICH is compounded by limited healthcare resources, the customization of treatment strategies based on a reliable prognostic tool like the ICH score can improve outcomes and ensure efficient allocation of resources.

AIMS AND OBJECTIVES

Research Objectives

Primary Objective:

- Assess the prognosis of patients with intracerebral hemorrhage (ICH) using the ICH score.
- Evaluate the predictive accuracy of the ICH score in determining:
  - 30-day mortality.
  - Functional outcomes in a tertiary care setting.

Secondary Objectives:

- Explore the association between clinical and demographic characteristics and patient prognosis.
- Identify key predictors of 30-day mortality, such as:
  - Age.
  - Glasgow Coma Scale (GCS) score.
  - Hematoma size.
  - Presence of intraventricular extension.
- Investigate implications for refining the scoring system or its application in specific populations.

1.5 Research Questions/Hypotheses

Research Questions:

- How effective is the ICH score in predicting 30-day mortality in patients with primary intracerebral hemorrhage?
- What clinical and demographic factors are significantly associated with patient outcomes?

Hypotheses:

- The ICH score is a reliable tool for predicting 30-day mortality in ICH patients.
- Specific predictors, such asGCS score and hematoma size, have a stronger influence on patient prognosis compared to other factors.
- The ICH score's predictive accuracy may vary based on demographic and clinical variables, offering potential for refinement or tailored application.

1.6 Scope and Limitations

The scope of this study is centered on patients diagnosed with primary intracerebral hemorrhage admitted to a tertiary care hospital in Belagavi, India. The study focuses on assessing the utility of the ICH score in this specific demographic and geographic context, where healthcare resources may be limited, and the burden of stroke is significant. Limitations of the study include potential challenges in data collection, such as loss to follow-up in patients discharged early and variability in clinical documentation. Additionally, the findings may be influenced by regional demographic characteristics and healthcare practices, which could limit their generalizability to other settings.[9] Despite these challenges, the study aims to provide valuable insights into the practical application of the ICH score in resource-limited environments.

REVIEW OF LITERATURE

1. A study conducted by Jochen A. Sembill et al. in 2020 validated the max-ICH Score as an improved prognostic tool for assessing functional long-term outcomes in patients with intracerebral hemorrhage (ICH). Using data from 4,677 patients across multiple German and US-based studies, the research compared the max-ICH Score to the traditional ICH Score in terms of diagnostic accuracy and clinical utility. The max-ICH Score demonstrated superior discrimination (AUROC 0.81–0.85 vs. 0.74–0.80, $p < 0.01$) and better clinical utility in minimizing false-positive poor outcome predictions, especially at high threshold probabilities. This enhanced accuracy and clinical net benefit were evident across various subgroups, including patients with and without early care limitations (ECL). The findings suggest that the max-ICH Score is a reliable tool for reducing unwarranted care limitations and improving treatment guidance in ICH patients.[14]
2. A study conducted by Rik Houben et al. in 2018 evaluated whether incorporating oral anticoagulant (OAC) use into the intracerebral hemorrhage (ICH) score improves its prognostic performance for 30-day mortality in ICH patients. Analyzing data from 1,232 cases, including 282 OAC-related ICH, the study confirmed that OAC use is independently associated with higher 30-day mortality (OR 2.09, 95% CI, 1.48–2.95; $p < 0.001$). However, the ICH score performed similarly in OAC-ICH and non-OAC-ICH cases (AUC 0.816 vs. 0.840, $p = 0.39$), and adding OAC use to create a "New ICH score" did not significantly improve predictive accuracy (AUC 0.840 vs. 0.837, $p > 0.05$). The study concluded that while OAC use is a mortality predictor, it does not

enhance the prognostic utility of the ICH score, which remains effective in both OAC and non-OAC ICH patients.[15]

3. A review article by Jens Witsch et al., published in 2021, examines the current state of prognostic scoring systems for intracerebral hemorrhage (ICH) and their utility in clinical practice. The review identifies 19 existing outcome prediction models, with endpoints including mortality and disability assessed at various time points. Using the Essen-ICH score as an example, the authors validated the score for predicting unfavourable outcomes, demonstrating good discrimination (AUC 0.87) but identifying calibration issues (intercept 1.0, slope 0.84) and highlighting its overall net benefit as a decision-making tool. Notably, only the max-ICH score met comprehensive validation standards, with gaps identified in many models, such as neglect of physiological predictors and the influence of withdrawal-of-care (WOC) bias.[6]
4. A study by Vivek P. Gupta et al., published in 2017, proposed the Intracerebral Hemorrhage Outcomes Project (ICHOP) scoring systems to improve prognostication of functional outcomes after intracerebral hemorrhage (ICH). Unlike the traditional ICH Score, the ICHOP scores incorporate systemic physiological factors, such as those from the Acute Physiology and Chronic Health Evaluation II, and premorbid functional status, as captured by the modified Rankin Scale (mRS). Using Random Forest machine learning on a dataset with over 200 data points per patient, two scores were developed: ICHOP3 for 3-month outcomes and ICHOP12 for 12-month outcomes. Both scores demonstrated higher accuracy than the ICH Score, with areas under the curve of 0.89 (3-month) and 0.87 (12-month) for predicting functional outcomes categorized as good (mRS 0–3) or poor (mRS 4–6).[16]

5. A study by Yue Suo et al., published in 2018, validated the performance of the maximally treated intracerebral hemorrhage (max-ICH) score for predicting long-term functional outcomes and mortality in patients with intracerebral hemorrhage (ICH) in China. Using data from the China National Stroke Registry (CNSR), the study evaluated the max-ICH score's predictive accuracy compared to six recognized models, including the ICH score, ICH functional outcome score (ICH-FOS), Essen-ICH score, modified intracerebral hemorrhage (MICH) score, intracerebral hemorrhage grading scale (ICH-GS), and functional outcome (FUNC) score. The max-ICH score showed good discrimination (AUC 0.83 for unfavourable functional outcomes and 0.81 for mortality) and calibration (Hosmer-Lemeshow P = 0.19), demonstrating comparable or superior performance to the other models.[17]
6. A study by McCracken et al., published in 2019, evaluated the predictive accuracy of the Intracerebral Hemorrhage (ICH) Score for 30-day mortality in the context of modern treatment practices. The retrospective review of 554 patients treated for acute spontaneous ICH at two large academic institutions revealed that while the overall mortality was 25.1%, survival rates for moderate-grade ICH Score patients (scores 3 and 4) exceeded original predictions (49% vs. 72%, P < .001, and 71% vs. 97%, P < .001). The findings suggested that patient survival has improved over time, potentially due to advances in medical and surgical management, though surgical intervention rates remained low and comparable across groups. Withdrawal of care was common, occurring in 56.6% of deaths and increasing with higher ICH Scores. The study concludes that the original ICH Score may overestimate mortality in contemporary practice, and re-evaluation of prognostic scoring systems is warranted to improve accuracy in outcome prediction.[18]

7. A review by João Pinho et al., published in 2019, provides a comprehensive update on outcomes following non-traumatic intracerebral hemorrhage (ICH), emphasizing the high short- and long-term mortality and the multifaceted nature of outcome assessments. While early case fatality rates can reach 40%, predictors such as age, neurological impairment severity, hemorrhage volume, and antithrombotic therapy use are consistently robust. Beyond mortality, long-term outcomes include functional status, health-related quality of life, cognitive impairment, psychiatric disorders, epilepsy, recurrent ICH, and thromboembolic events. Various validated prognostic scores exist to predict survival and functional outcomes, but they must be complemented by clinical judgment for individualized care.[7]
8. A systematic review and meta-analysis by Tiago Gregório et al., published in 2018, assessed and compared the four most extensively validated prognostic scales for intracerebral hemorrhage (ICH): the ICH score, ICH grading scale (ICH-GS), modified ICH score, and FUNC score. Data from 53 studies validating the ICH score, 14 for ICH-GS, eight for the FUNC score, and five for the modified ICH score were analyzed. Pooled C-statistics for discrimination ranged from 0.76 (FUNC for functional outcome at discharge) to 0.85 (ICH-GS for mortality at 3 months). While the ICH score showed the highest discrimination for mortality (C = 0.84) and the modified ICH score for functional outcomes (C = 0.80), these differences were not statistically significant. The study concluded that the ICH score remains the most extensively validated and reliable tool for predicting mortality.[19]
9. A study by Jochen A. Sembill et al., published in 2017, evaluated the impact of early care limitations (ECL) on prognostication models for intracerebral hemorrhage (ICH) and introduced the max-ICH score as a more accurate

severity assessment tool for maximally treated patients. The observational cohort study analyzed 583 ICH patients over five years, finding that ECL was present in 19.2% of cases, all of whom died. Propensity score matching suggested that 50.7% of these patients might have survived, with 18.8% potentially achieving favorable outcomes (mRS 0–3). Conventional prognostication was confounded by ECL, reducing predictive accuracy (AUC 0.67 vs. 0.80, $p < 0.01$) and overestimating poor outcomes. The max-ICH score (0–10), integrating predictors like NIH Stroke Scale score, age, intraventricular hemorrhage, anticoagulation, and ICH volume, demonstrated improved predictive validity for 12-month outcomes (AUC 0.81, CI 0.77–0.85, $p < 0.01$). It identified favorable outcomes in 45.4% of maximally treated patients and long-term mortality of 30.1%. [20]

10. A study by Hiten N. Panchal et al., published in 2012, assessed the predictive accuracy of the original Intracerebral Hemorrhage (ICH) score for mortality in primary ICH patients. The study found that all patients with an ICH score of 0 survived, while those with scores of 1, 2, 3, and 4 had progressively increasing mortality rates of 10%, 53%, 71%, and 100%, respectively. Additionally, hematoma volume was identified as an independent predictor of mortality: 56% of patients with hematomas <30 mL survived, compared to only 10% with hematomas >30 mL.[4]
11. A multicentre cohort study by Sonia Rodríguez-Fernández et al., published in 2012, validated the Intracerebral Hemorrhage (ICH) score in patients with spontaneous ICH admitted to intensive care units (ICUs) in Andalusia, Spain. The study included 336 patients, 105 of whom underwent surgery, with a median age of 62 years. The ICH score demonstrated acceptable discrimination for predicting 30-day mortality, with an area under the ROC

curve of 0.74 (95% CI 0.69–0.79). However, its calibration was found to be suboptimal, particularly at extreme ends of the score. Mortality was higher than predicted at lower scores and lower than predicted at higher scores (Hosmer-Lemenshow test H=55.89, p<0.001). The in-hospital mortality rate was 54.17%, closely aligning with the APACHE-II predicted mortality (SMR 0.95, n.s.).[9]

12. A validation study by Taha Nisar et al., published in 2018, assessed the predictive accuracy of the Intracerebral Hemorrhage (ICH) score for 30-day mortality in a large urban population. The retrospective review of 245 adult patients with acute ICH found a 30-day mortality rate of 36%. The study confirmed that increasing ICH scores were associated with higher mortality, with four variables—ICH volume ≥30 ml (OR 17.24, 95% CI 8.33–35.66), intraventricular hemorrhage (OR 6.91, 95% CI 3.72–12.85), low Glasgow Coma Scale scores (P < 0.001), and infratentorial origin of bleed (OR 2.17, 95% CI 1.07–4.40, P = 0.039)—significantly linked to 30-day mortality. However, age ≥80 years was not significantly associated with mortality in this cohort (OR 1.49, 95% CI 0.70–3.17, P = 0.325).[5]

13. A review by Isabel C. Hostettler, David J. Seiffge, and David J. Werring, published in 2019, provides an update on the diagnosis and treatment of spontaneous non-traumatic intracerebral hemorrhage (ICH), a condition primarily caused by small vessel diseases such as hypertensive arteriopathy or cerebral amyloid angiopathy (CAA). Despite accounting for only 10–15% of all strokes, ICH contributes significantly to stroke-related mortality and morbidity, with limited proven effective treatments. The review highlights advancements in understanding ICH etiology, diagnosis (including novel brain imaging biomarkers), pathophysiology, and classification. Current treatment

approaches focus on acute interventions, such as therapies targeting hematoma expansion, hemoglobin toxicity, inflammation, and edema, as well as anticoagulant reversal and minimally invasive surgeries. The authors emphasize the importance of improved classification of underlying arteriopathies through neuroimaging and genetic studies, enabling tailored prevention strategies like sustained blood pressure control and optimized antithrombotic therapy. While progress has been made, the poor clinical outcomes underscore the need for further research to address the many challenges that remain.[21]

14. A study by Felix A. Schmidt et al., published in 2018, compared the prognostic performance of the maximally treated intracerebral hemorrhage (max-ICH) score and the original ICH score for predicting mortality and functional outcomes in patients with spontaneous ICH. Using data from 372 patients, including 71 (19%) who underwent care limitations, the study evaluated 3-month outcomes using the modified Rankin Scale (mRS). Both the ICH score and max-ICH score demonstrated good prognostic performance for mortality and poor functional outcomes (mRS 4–6), with area under the ROC curve (AUC) values ranging from 0.80 to 0.86 in both the full group and the subgroup receiving maximal treatment. No significant differences were found between the scores for either endpoint, suggesting similar predictive accuracy.[12]

15. A brief report by Dawn M. Meyer et al., published in 2015, validated the intracerebral hemorrhage (ICH) score as a predictor of 30-day mortality in an international, heterogeneous cohort of 399 patients from the Novo Nordisk trial F7ICH-1371. The study evaluated both the baseline and 72-hour ICH scores. While the baseline score demonstrated high specificity (95%) but low

sensitivity (36%), the 72-hour score exhibited improved sensitivity (75%) but slightly lower specificity (89%). The positive predictive value (PPV) ranged between 57% and 76% for both scores. The findings suggest that the baseline ICH score provides a reliable PPV, while the 72-hour score enhances sensitivity, making both scores useful for predicting mortality in clinical practice. These results can assist practitioners in making more accurate prognostic assessments for ICH patients.[11]

16. A study conducted by Waseem Muhammed Ilyas and Gajanan Chavan in 2021 explored the utility of the Intracerebral Hemorrhage (ICH) score in predicting 30-day mortality and improving patient management in cases of intracerebral hemorrhage (ICH). The research highlighted the ICH score as a reliable prognostic tool, with higher scores correlating to increased mortality. Patients presenting with ICH were evaluated for variables including Glasgow Coma Scale (GCS), age, hematoma volume, infratentorial origin, and the presence of intraventricular hemorrhage to determine their ICH score. The findings suggest that incorporating the ICH score into assessment protocols in emergency settings can enhance the quality of care by facilitating timely and appropriate interventions, ultimately improving outcomes for patients with ICH.[22]

17. A study conducted by I. Putu Eka Widyadharma et al., published in 2021, assessed the predictive performance of the modified Intracerebral Hemorrhage (mICH) score compared to the original ICH (oICH) score for predicting 30-day mortality, significant disability, and good outcomes in non-traumatic ICH patients. The retrospective cohort study involved 311 patients, with a 30-day mortality rate of 39.9% and a similar proportion achieving good outcomes. Independent predictors of mortality included low Glasgow Coma Scale (GCS),

high NIH Stroke Scale (NIHSS) on admission, and respiratory failure, while predictors of good outcomes were low NIHSS and absence of significant mass effect (midline shift > 5 mm).

The mICH score incorporated adjustments such as replacing GCS with NIHSS, lowering the age cut-off to >55 years, and including respiratory failure and mass effect as additional factors. It outperformed the oICH score in sensitivity (80.6% vs. 50.8%) and had comparable specificity (88.7% vs. 89.3%) for predicting 30-day mortality. For good outcomes, the mICH score also demonstrated higher sensitivity (86.3% vs. 77.4%) and similar specificity (74.6% vs. 77.8%). The modified score showed a more linear association with outcomes, making it statistically superior to the original ICH score for both mortality and good outcome predictions.[10]

18. A study conducted by Isabel C. Hostettler et al. in 2020 provides a comprehensive update on the diagnosis and treatment of intracerebral hemorrhage (ICH), emphasizing its significant public health burden due to high morbidity and mortality rates. Although ICH accounts for only 10–15% of all strokes, it has the highest mortality, with rates reaching 35% at 7 days and 59% at 1 year. The study highlights primary causes such as chronic hypertension and cerebral amyloid angiopathy and secondary causes including vascular abnormalities and anticoagulation.

Key management strategies include aggressive blood pressure control, early hemostasis, reversal of coagulopathies, and surgical interventions like hematoma evacuation. The study emphasizes the importance of advanced imaging techniques such as MRI and CT for diagnosis, etiological classification, and predicting hematoma expansion. While minimally invasive surgical approaches hold promise, challenges remain in reducing early

mortality rates, underscoring the need for continued research to enhance outcomes for ICH patients.[3]

19. A study conducted by Laurent Puy et al. in 2023 highlights the devastating impact of intracerebral hemorrhage (ICH), a condition caused by the rupture of a cerebral vessel, leading to blood entering the brain parenchyma. ICH is a significant contributor to stroke-related mortality, with only half of patients surviving for one year, and survivors often facing long-term sequelae that impair quality of life. The study notes an increasing incidence of ICH over recent decades, attributed to shifts in underlying vessel diseases, improved vascular prevention, and greater use of antithrombotic agents.

The pathophysiology of ICH involves complex processes, including mechanical mass effect, hematoma expansion, and secondary injury. While advancements have been made in identifying causes and predicting outcomes, no specific treatment currently exists. Prevention of hematoma expansion remains a critical therapeutic target during the acute phase, while long-term management focuses on individualized secondary prevention and vascular risk factor control, highlighting the ongoing challenges in improving outcomes for ICH patients.[2]

20. A study conducted by Veltkamp and Purrucker in 2017 reviewed current medical and surgical treatments for spontaneous intracerebral hemorrhage (ICH). The authors highlighted that hemostatic agents, such as factor VIIa and tranexamic acid, may reduce hematoma expansion if administered early, although their clinical effectiveness remains unproven. For anticoagulation reversal, prothrombin concentrates (PCC) with vitamin K are recommended for vitamin K antagonist-related ICH, idarucizumab is effective for dabigatran-related ICH, and PCC is suggested for Factor Xa inhibitor-related

ICH due to the absence of specific reversal agents. Surgical interventions, including minimally invasive techniques and hemicraniectomy, are undergoing clinical trials, while therapies targeting secondary neuronal damage are challenged by the complex pathophysiology of ICH.[13]

BASIC SCIENCE

3.1 Pathophysiology of Intracerebral Hemorrhage

3.1.1 Mechanisms of Spontaneous Intracerebral Hemorrhage

Spontaneous intracerebral hemorrhage (ICH) results from the rupture of small penetrating arteries, typically secondary to chronic hypertension or cerebral amyloid angiopathy (CAA).[1,2] Chronic hypertension causes degenerative changes in the vessel walls, such as lipohyalinosis and the formation of Charcot-Bouchard microaneurysms, making the vessels more prone to rupture. In CAA, amyloid-β protein deposition within the walls of cortical and leptomeningeal vessels leads to vessel fragility and rupture.[1,3] Other etiological factors include the use of anticoagulants, coagulopathies (e.g., hemophilia, thrombocytopenia), arteriovenous malformations, moyamoya disease, and illicit drug use (e.g., cocaine, amphetamines), which elevate blood pressure or compromise vascular integrity.[1,2]

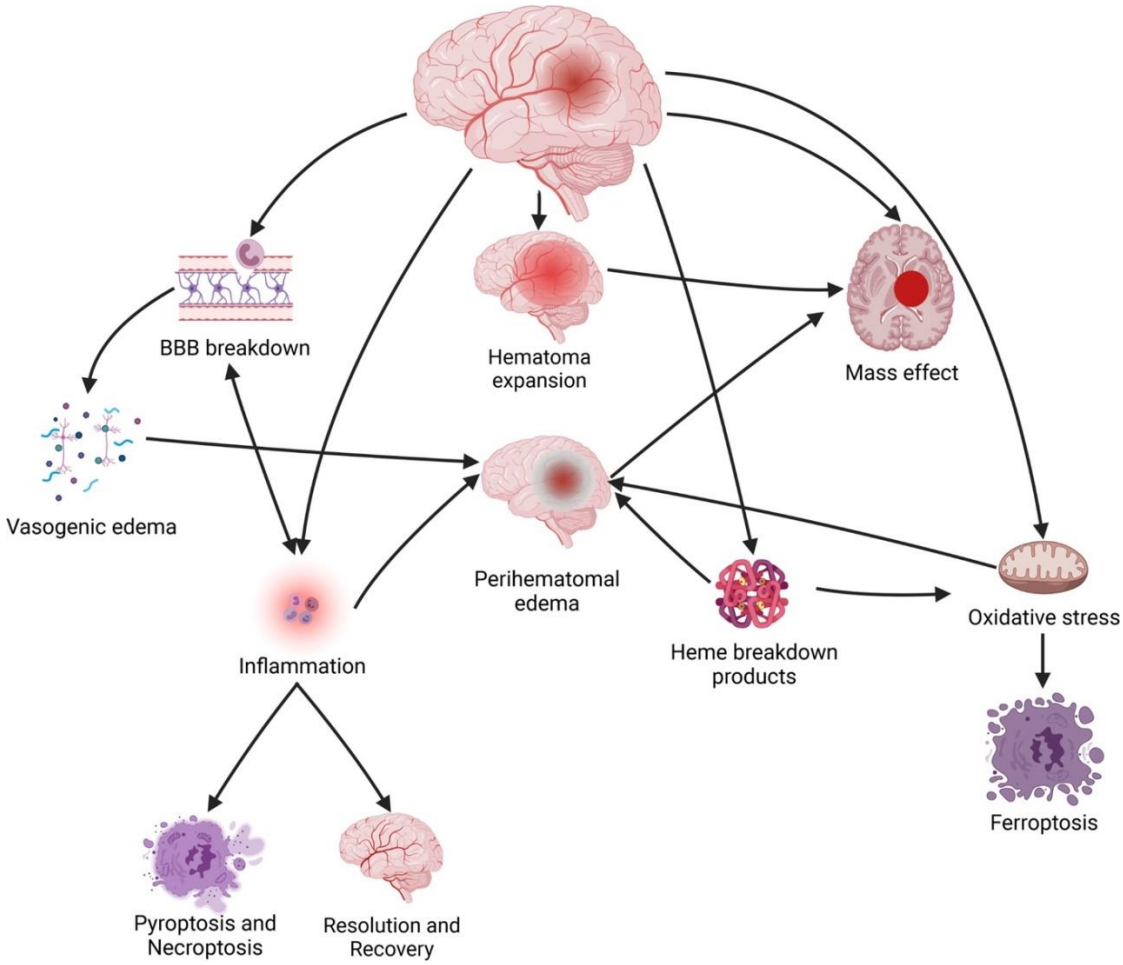
3.1.2 Hemodynamic and Neuroinflammatory Responses to Hematoma Formation

The initial rupture of a vessel leads to the rapid accumulation of blood within the brain parenchyma, causing a sudden rise in intracranial pressure (ICP) and disruption of cerebral autoregulation. This hemodynamic disturbance creates a perihematomal region of ischemia due to mechanical compression of adjacent tissue and a reduction in regional cerebral blood flow. Concurrently, neuroinflammatory responses are triggered as blood components extravasate into the brain parenchyma. Microglia and astrocytes become activated, releasing pro-inflammatory cytokines, such as interleukin-1β, interleukin-6, and tumour necrosis factor-α.[1,3] These cytokines further exacerbate blood-brain barrier (BBB) disruption, leading to vasogenic edema

and recruitment of peripheral immune cells. The breakdown of erythrocytes within the hematoma releases hemoglobin, which is metabolized into toxic by-products such as heme and iron, amplifying oxidative stress and neuronal injury.[1,2]

3.1.3 Secondary Brain Injury and Its Effects on Prognosis

Secondary brain injury following ICH is a cascade of pathological processes that extend beyond the initial mechanical damage.[1,3] Key components of secondary injury include perihematomal edema, neuronal apoptosis, and excitotoxicity. Perihematomal edema, which develops as a combination of cytotoxic and vasogenic mechanisms, peaks within 3 to 7 days after ICH and contributes significantly to mass effect and neurological deterioration. Neuronal apoptosis is mediated by excitotoxicity, resulting from excessive glutamate release and calcium influx, leading to mitochondrial dysfunction and cell death. Furthermore, oxidative stress from hemoglobin breakdown products induces lipid peroxidation and DNA damage, exacerbating neuronal loss. The severity of secondary brain injury strongly correlates with clinical outcomes, emphasizing the critical need for early therapeutic interventions to mitigate these processes.[1,2]



Cerebral Hemorrhage Pathophysiology

3.2 Prognostic Markers in ICH

3.2.1 Role of Clinical Markers

Several clinical markers play a critical role in predicting outcomes following intracerebral hemorrhage (ICH). Age is one of the most significant predictors, with advanced age associated with poorer outcomes. Older individuals tend to have reduced neuroplasticity, which diminishes the brain's ability to adapt to and recover from injury. Additionally, comorbidities such as hypertension, diabetes, and cardiac disease are more prevalent in older populations, further complicating prognosis.[7,10]

The Glasgow Coma Scale (GCS) is another key clinical marker, as it provides an assessment of a patient's level of consciousness at presentation.[4] Lower GCS scores are indicative of severe neurological impairment and are strongly correlated with higher mortality rates and worse functional outcomes. For example, patients presenting with a GCS score of 8 or below are considered to have a severe injury and are at a significantly increased risk of death.[11]

Hematoma volume is a well-established determinant of ICH outcomes. Larger hematomas (≥30 mL) are associated with increased intracranial pressure, greater mass effect, and a higher likelihood of secondary brain injury, all of which contribute to higher mortality and poor functional recovery.[3] Quantification of hematoma volume using imaging modalities, such as the ABC/2 method on CT scans, is a routine part of clinical evaluation.[3,1]

Intraventricular extension of hemorrhage is another critical prognostic factor. Blood that extends into the ventricular system often results in obstructive hydrocephalus, increased intracranial pressure, and a heightened neuroinflammatory response.[5] These complications are associated with significantly worse outcomes, including higher rates of mortality and severe disability. Managing intraventricular hemorrhage often requires additional interventions, such as external ventricular drainage, to alleviate hydrocephalus and reduce pressure.[11]

The interplay of these clinical markers provides valuable insights into the severity of ICH and helps guide treatment decisions and prognostication. Incorporating these parameters into scoring systems, such as the ICH score, enables clinicians to stratify patients based on their risk profiles and tailor management strategies accordingly.[12]

3.2.2 Molecular and Imaging Biomarkers

Molecular and imaging biomarkers provide critical insights into the pathophysiology of intracerebral hemorrhage (ICH) and aid in prognostication and treatment planning.Inflammatory markers such as elevated levels of C-reactive protein (CRP), interleukins (e.g., IL-1β, IL-6), and matrix metalloproteinases (MMPs) serve as indicators of systemic and neuroinflammatory responses.[3] These markers are associated with blood-brain barrier disruption, perihematomal edema, and secondary brain injury. Elevated CRP levels have been linked to worse functional outcomes and higher mortality rates in ICH patients. Similarly, increased activity of MMPs exacerbates hemorrhagic damage by degrading extracellular matrix proteins, thereby destabilizing the vascular and parenchymal structures.

Neuroimaging biomarkers also play a pivotal role in assessing ICH severity and guiding clinical decisions. Irregular hematoma shapes and heterogeneous densities on non-contrast computed tomography (CT) scans suggest active bleeding and are associated with an increased risk of hematoma expansion.[1,3] These findings often correlate with more severe neurological deficits and worse outcomes.

The "spot sign," a hallmark neuroimaging biomarker identified on contrast-enhanced CT, indicates ongoing active bleeding within the hematoma.[1,3] It is characterized by focal contrast extravasation and is a reliable predictor of hematoma expansion, higher mortality, and poor functional recovery. Identifying the spot sign can guide the use of targeted hemostatic interventions to limit hematoma growth.The ICH score integrates clinical markers (age, GCS, hematoma volume, and intraventricular extension) to stratify patients based on mortality risk. A higher score corresponds to poorer outcomes, providing a validated tool for prognostication.[4, 12]

3.3 Imaging in ICH

3.3.1 Role of CT and MRI in Diagnosis and Prognosis

Non-contrast computed tomography (CT) is the gold standard for diagnosing intracerebral hemorrhage (ICH) due to its widespread availability, rapid imaging capabilities, and high sensitivity for detecting acute bleeding.[1,3,13] CT scans enable precise localization of hematomas, evaluation of their volume, and detection of associated features such as intraventricular extension or mass effect. Additionally, CT angiography (CTA) can identify vascular abnormalities and the "spot sign," which indicates active bleeding and predicts hematoma expansion.[1,3]

Magnetic resonance imaging (MRI), although less commonly used in the acute setting, provides superior sensitivity for detecting microbleeds, which may indicate underlying conditions such as cerebral amyloid angiopathy (CAA) or chronic hypertension. Specific MRI sequences, including susceptibility-weighted imaging (SWI) and gradient-echo imaging, are particularly useful for visualizing hemosiderin deposits and vascular malformations. MRI also aids in differentiating ICH from ischemic stroke with hemorrhagic transformation, tumors, or other mimicking conditions.[1]

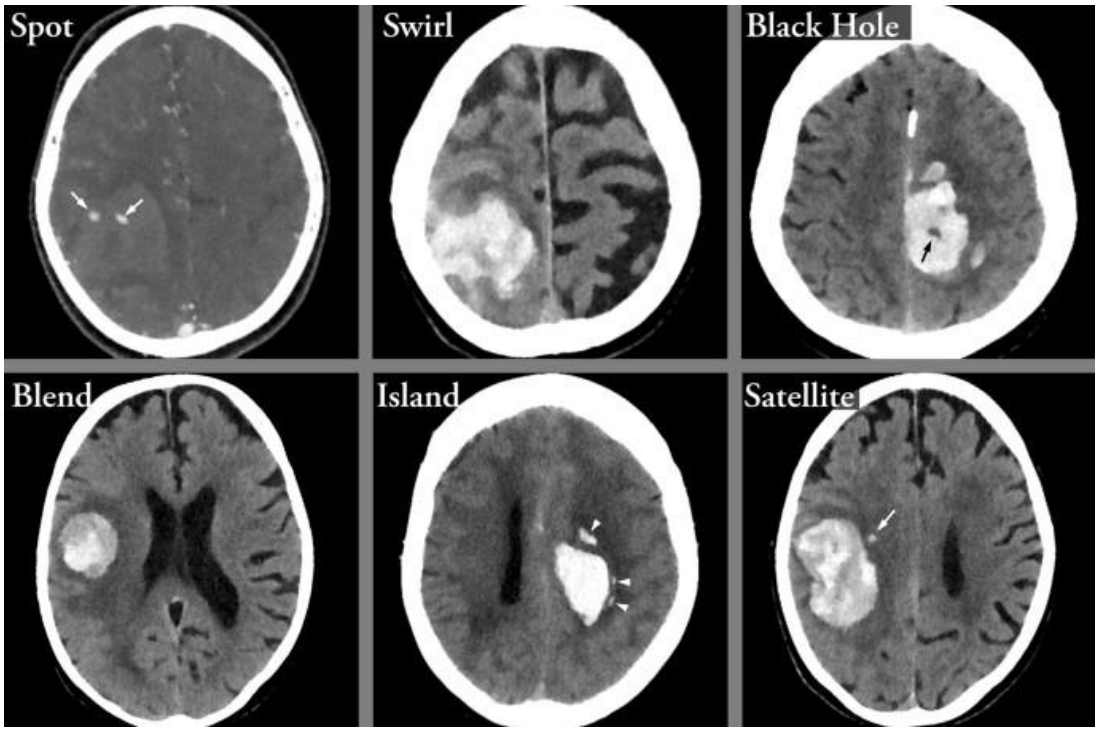
3.3.2 Imaging-Based Quantification of Hematoma Characteristics

Accurate quantification of hematoma volume is essential for assessing the severity of ICH and determining prognosis. The ABC/2 method, performed on CT scans, is a widely used and reliable technique for estimating hematoma volume in clinical practice.[4,5] Advanced imaging modalities, such as perfusion-weighted MRI, allow for the evaluation of perihematomal ischemia, which contributes to secondary

brain injury. Diffusion tensor imaging (DTI) provides insights into white matter integrity and disruption, offering a deeper understanding of the extent of brain injury and its functional implications.[13]

3.3.3 Advances in Imaging Technologies

Emerging imaging technologies have significantly improved the assessment and management of ICH. CT perfusion imaging enables dynamic evaluation of cerebral blood flow and perfusion deficits around the hematoma, helping to identify areas at risk of ischemia.[3] Functional MRI (fMRI) assesses brain activity and connectivity, offering potential insights into recovery mechanisms and therapeutic targets. Molecular imaging techniques, such as PET-MRI, are being explored for their ability to visualize inflammatory processes, metabolic changes, and neuronal injury in vivo.[1,3] These advances promise to refine diagnostic accuracy and guide the development of targeted interventions.



Computed tomography in acute intracerebral hemorrhage

3.4 Basis for the ICH Score

The ICH score is a validated clinical tool designed to predict 30-day mortality following intracerebral hemorrhage. It incorporates five parameters, each with established prognostic significance.[3]

Hematoma volume is directly correlated with the severity of mass effect and the likelihood of secondary brain injury. Larger hematomas are associated with increased intracranial pressure and higher mortality rates. The Glasgow Coma Scale (GCS) measures the level of consciousness and neurological impairment; lower scores indicate more severe injury and worse outcomes. Intraventricular extension of hemorrhage is included in the score due to its association with hydrocephalus, increased intracranial pressure, and poor prognosis. Age is another critical factor, as older patients typically have reduced physiological resilience and greater comorbidities, compounding their risk of adverse outcomes. These parameters collectively provide a comprehensive assessment of the severity and likely trajectory of ICH.

Numerous studies have validated the predictive accuracy of the ICH score. Hemphill et al. demonstrated its utility in stratifying patients by mortality risk, with scores ranging from 0 (associated with <5% mortality) to 5 (associated with >90% mortality). Subsequent research has confirmed that the score reliably predicts short-term outcomes and assists in clinical decision-making, particularly in determining the intensity of care and the appropriateness of invasive interventions. The ICH score remains a cornerstone of prognostication in the management of intracerebral hemorrhage, guiding both clinicians and patients in understanding the likely course of the disease.[1,3]

ICH Score Table

Parameter	Points
GCS score*	
- 3–4	2
- 5–12	1
- 13–15	0
ICH Volume **	
- ≥ 30 cm^3	1
- < 30 cm^3	0
IVH*	
- Yes	1
- No	0
Infratentorial origin of ICH	
- Yes	1
- No	0
Age	
- ≥ 80	1
- < 80	0

ICH Total Score: 0–6

The ICH Score is a clinical grading scale that allows for risk stratification of patients presenting with ICH. The five categories are independent predictors of 30-day mortality. Mortality rises as the ICH Score increases. The use of the ICH Score could improve standardization of treatment protocols and clinical research studies in ICH.

- *GCS*: Glasgow Coma Scale score on initial presentation (or after resuscitation).
- **ICH Volume**: Volume on initial CT calculated using the ABC/2 method.
- **IVH**: Presence of any intraventricular hemorrhage on initial CT.

3.5 Clinical Implications

A thorough understanding of the pathophysiology of intracerebral hemorrhage (ICH) plays a crucial role in improving clinical outcomes. By elucidating the mechanisms underlying primary and secondary brain injury, clinicians can identify therapeutic targets and implement timely interventions. For instance, understanding the role of neuroinflammation has led to the development of therapies aimed at modulating inflammatory cascades, thereby reducing neuronal damage and improving recovery. Similarly, insights into the mechanisms of oxidative stress have prompted the exploration of antioxidants and neuroprotective agents to minimize free radical-induced injury. Early recognition and control of perihematomal edema, informed by basic science research, can mitigate mass effect and prevent further neurological deterioration. These interventions, grounded in a mechanistic understanding of ICH, significantly enhance patient care and outcomes.[1]

Treatment strategies for ICH are closely aligned with its underlying pathophysiological processes. Blood pressure management, a cornerstone of ICH care, is informed by the need to prevent hematoma expansion and secondary ischemic injury. Anticoagulation reversal therapies, such as the administration of prothrombin complex concentrates or specific reversal agents like idarucizumab, are guided by an understanding of coagulopathy-related hemorrhages.[1,3,13] Surgical interventions, including hematoma evacuation and external ventricular drainage, are employed based on knowledge of the mass effect, intracranial pressure dynamics, and intraventricular hemorrhage.

Recognition of the role of hematoma expansion has also influenced the use of hemostatic agents and imaging biomarkers, such as the "spot sign," to guide early intervention.[1,2,3] Furthermore, advances in neuroimaging and molecular studies have highlighted the importance of targeting neuroinflammation and oxidative stress, leading to the exploration of novel therapies aimed at improving neurological recovery.

MATERIALS AND METHODS

4.1 Study Design

The study is an observational, prospective cohort study.

4.2 Study Setting

The study is conducted at a tertiary care hospital in Belagavi. The study duration spans from January 2023 to December 2023, allowing sufficient time for recruitment and follow-up of the required sample size.

4.3 Study Population

The target population includes patients aged over 18 years diagnosed with primary intracerebral hemorrhage (ICH).

Inclusion Criteria

- Age > 18 years.
- Primary ICH (documented neural defects along with cerebral parenchymal bleeding with no evidence of trauma or history of surgery).
- Consent of the patient or their relatives (in cases of disrupted consciousness).

Exclusion Criteria

- Age < 18 years.
- Pregnancy.

- Cerebral hemorrhage caused by trauma, cerebral hemorrhage in brain tumors, hemorrhagic transformation of ischemic stroke, or aneurysm/vascular malformations.

4.4 Sampling

A total of 67 patients with primary ICH who were referred and hospitalized in the emergency department of a tertiary care hospital in Belagavi were enrolled. Sampling was conducted as a full census. CT Brain was performed within 24 to 48 hours of admission to the hospital. The ICH score was calculated. Patients were followed up until discharge or death, and prognosis was assessed 30 days from the date of admission. If a patient was discharged before 30 days, follow-up was conducted via phone calls.

4.5 Sample Size Calculation

The minimum sample size formula based on prevalence rate is

$$n = \frac{z_\alpha{}^2 P(1-P)}{d^2}$$

where

P is the prevalence rate

d is the percentage likely difference in the prevalence.

z is linked with the level of significance.

For a 5% level of significance, **z = 1.96**.

(Reference: *Clinical Profile of Patients with Acute Intracerebral Hemorrhage and ICH Score as an Outcome Predictor on Discharge, 30-Day, and 60-Day Follow-Up* by Piyush Ojha et al.)

The parameter considered in the calculation is the rate of mortality of patients suffering from ICH, which is estimated to be between 30% and 50%.

The calculated sample size is 61.

Taking into consideration the loss of cases during follow-up (assuming 10%), the final sample size was raised to **67**.

Total samples collected in the study is 73.

4.6 Data Collection Tools

A one-year hospital-based prospective observational study was conducted from January 2023 to December 2023, at a tertiary care center in Belagavi. Informed consent was obtained from all participantspatients above 18 years of age, before enrolling in the study. Upon enrollment, each patient's Glasgow Coma Scale (GCS) score was assessedand a CT brain scan was performed within 24 to 48 hours of admission for clinically suspected cases of intracranial bleeding. The Intracerebral Hemorrhage (ICH) score was calculated for all participants and they were followed until death or discharge. Patients who were discharged before 30 days, follow-up was conducted via phone calls to monitor outcomes.

4.7 Variables

The study includes both independent and dependent variables. Independent variables consist of age, GCS score, hematoma size, location, and the presence of

intraventricular hemorrhage. Dependent variables include mortality and functional outcomes, which will be assessed during hospital stay and follow-up. These variables were selected to explore associations and predictors of clinical outcomes in ICH.

4.8 Data Collection Procedure

Patient recruitment begins with screening for eligibility, followed by obtaining informed consent. Clinical assessments, including GCS scoring and CT imaging were conducted during the hospital stay. Follow-up assessments were performed 30 days post-discharge via phone calls. To ensure data quality and accuracy, regular audits of data entry and validation processes were performed throughout the study.

4.9 Statistical Analysis

Descriptive statistics, including mean, median, and standard deviation, will summarize the data. Inferential statistics such as chi-square tests, t-tests, regression analysis, and ROC curve analysis will assess associations and predictors. A significance level of $p < 0.05$ is set to determine statistical relevance. Data analysis is conducted using advanced statistical software to ensure precision and reproducibility.

4.10 Ethical Considerations

Ethical approval for the study has been obtained from the JNMC Institutional Ethics Committee. Measures are in place to protect participant confidentiality, including anonymized data storage and restricted access to sensitive information. Potential conflicts of interest have been addressed to maintain the integrity of the research.

RESULTS

Table 1: Gender Distribution of the Study Participants

Variable		Frequency (n)	Percent (%)
Gender	Male	50	68.5
	Female	23	31.5
	Total	**73**	**100.0**

Figure 1: Gender Distribution of the Study Participants

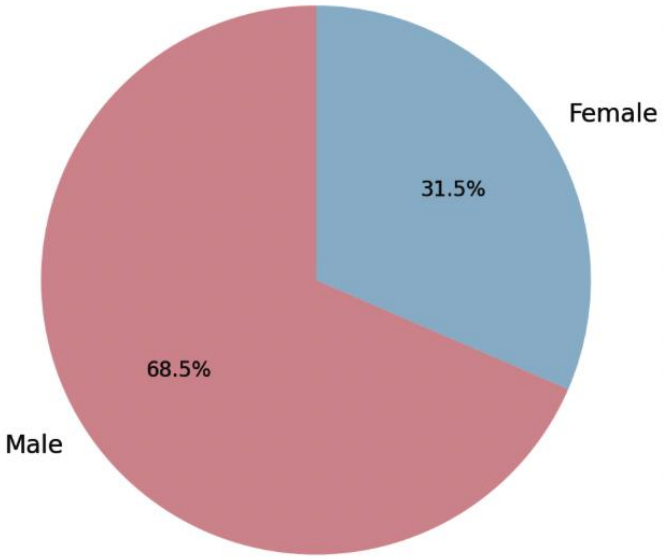


Table 1 and Figure 1 shows that there are 73 study participants in the study. Among them, 50 are male (68.5%) and 23 are female (31.5%).

Table 2: Age wise distribution of study participants

Age	Frequency	Percentage
0-20	1	2
20-40	7	14
40-60	22	44
60-80	15	30
80-100	5	10

Figure 2: Age wise distribution of study participants

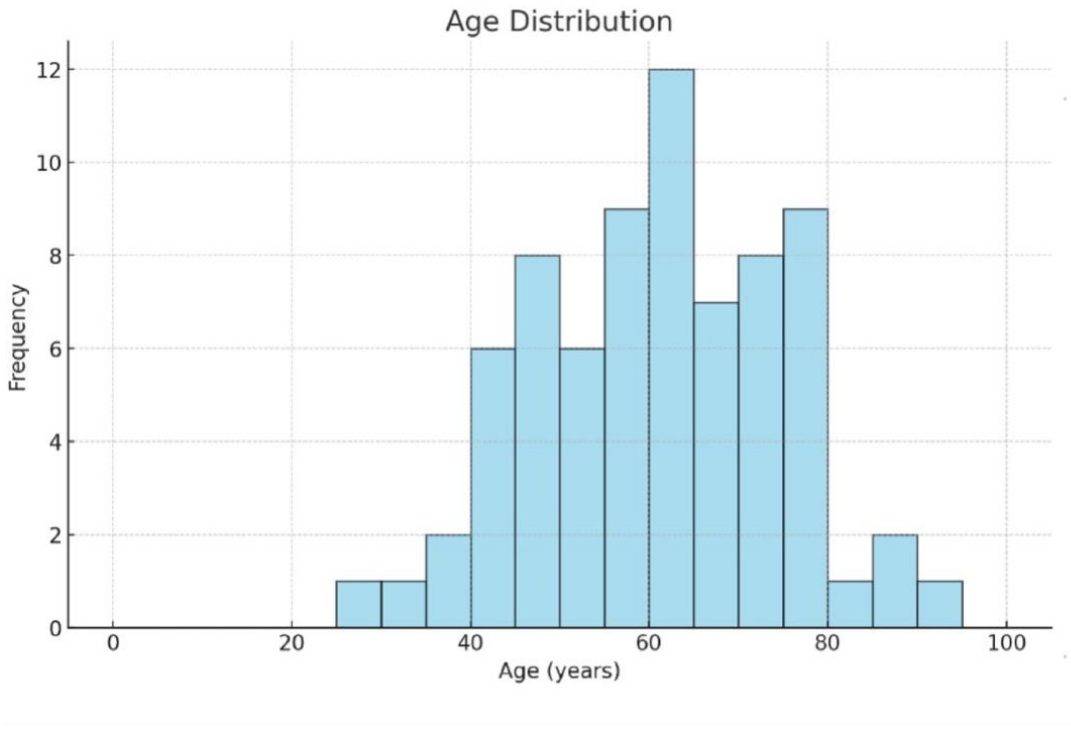


Table 2 and Figure 2 shows age wise distribution of patients. The majority of individuals are between 40 and 80 years old. Peak frequency occurs around 60 years old, thus we can conclude that highest concentration of people are there in this age group. The age distribution is not uniform, it is concentrated around middle-to-older age groups. The participants below 30 years are less in number.

Table 3: Distribution of ICH score

Variable		Frequency (n)	Percent (%)
ICH score	0	17	23.3
	1	15	20.5
	2	10	13.7
	3	14	19.2
	4	12	16.4
	5	5	6.8
	Total	**73**	**100.0**

Figure 3: Distribution of ICH score

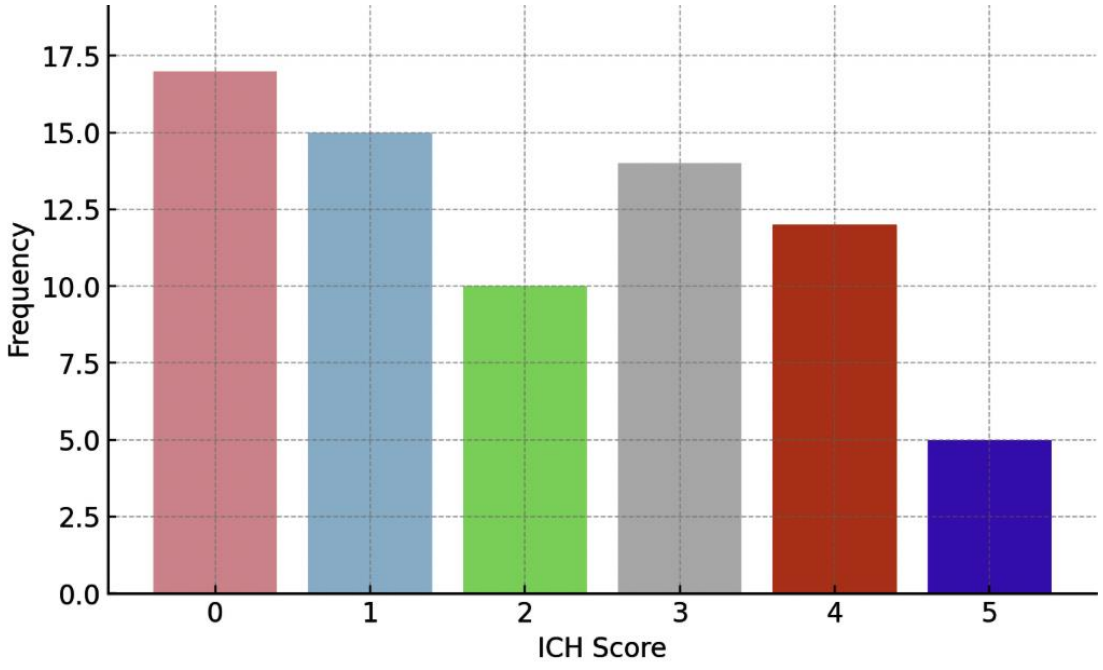
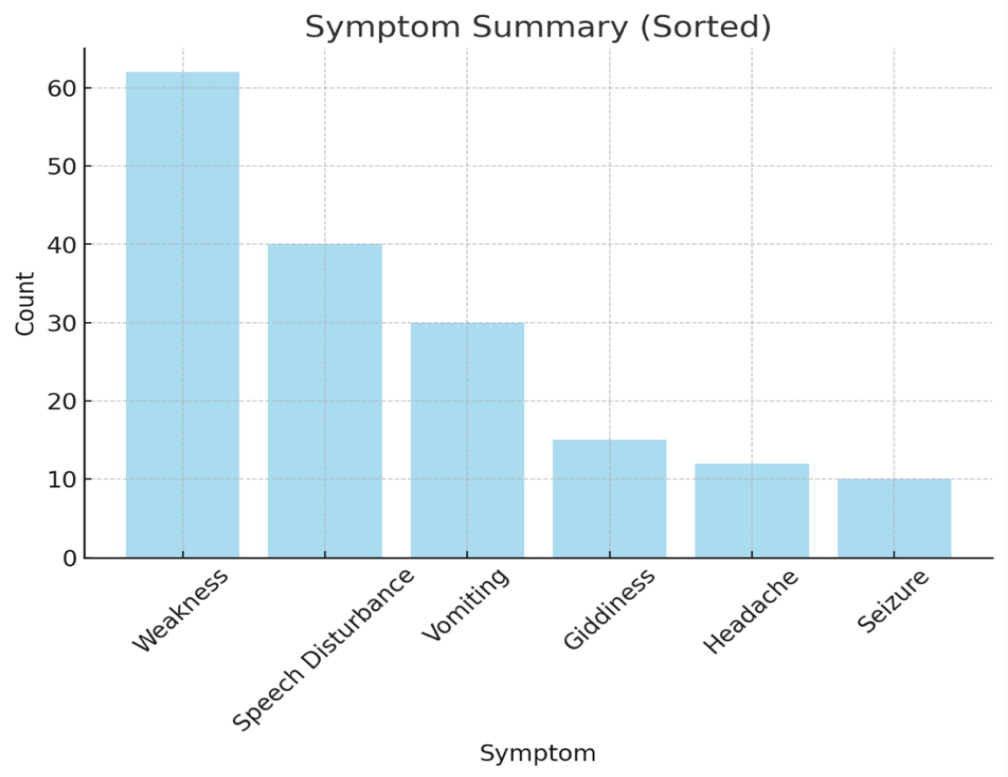


Table 3 and Figure 3 shows the distribution of participants based on their ICH (Intracerebral Hemorrhage) scores, which are used to assess the severity of the condition. Among the 73 participants, 17 individuals (23.3%) had an ICH score of 0, indicating minimal or no severe bleeding. Fifteen participants (20.5%) had a score of 1, while 10 participants (13.7%) had a score of 2. Fourteen participants (19.2%) had an ICH score of 3, suggesting moderate severity. Twelve participants (16.4%) had a score of 4, and 5 participants (6.8%) had the highest score of 5, indicating the most severe cases of intracerebral hemorrhage.

Table 4: Distribution of symptoms

Symptom	Count	Percentage (%)
Weakness	62	86.1
Speech Disturbance	40	55.6
Vomiting	30	41.7
Giddiness	15	20.8
Headache	12	16.7
Seizure	10	13.9

Figure 4: Distribution of Symptoms



In our study weakness was the most common symptom, affecting 86.1% of cases, making it a major presenting symptom. Speech disturbance was the second most prevalent symptom, occurring in 55.6% of cases. Vomiting was also relatively common, affecting nearly 42% of individuals. In contrast, giddiness and headache were less frequent, occurring in 20.8% and 16.7% of cases, respectively.

Figure 5 : Distribution of co-morbidities

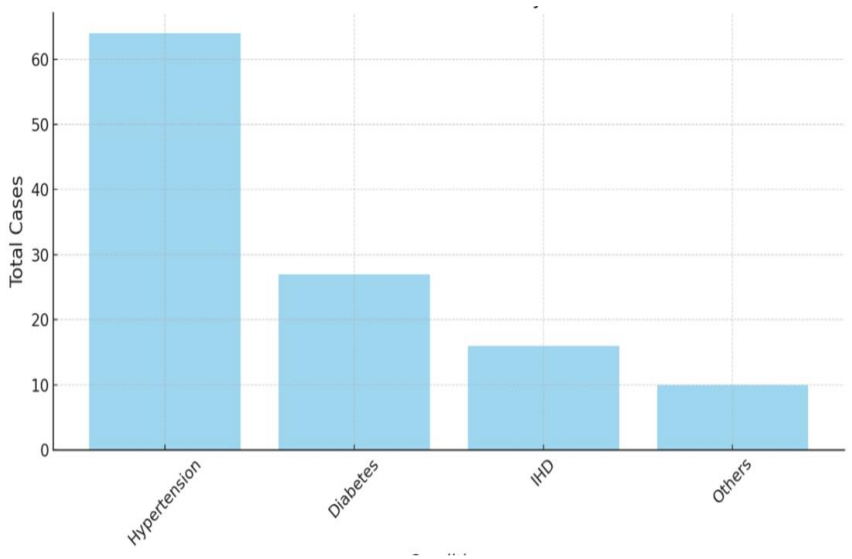


Table 4: Distribution of co-morbidities

Condition	Total Cases	Percentage (%)
Hypertension	64	53.3
Diabetes	28	23.3
IHD	18	15.0
Others	10	8.3

Hypertension was the most prevalent comorbidity in patients with intracerebral hemorrhage, affecting 53.3% of cases. This highlights its strong association with the Intracerebral hemorrhage contributes to increased vascular fragility and the risk of hemorrhage. Diabetes was the second most common comorbidity, present in 23.3% of cases, which may further exacerbate vascular damage and complicate recovery. Additionally, ischemic heart disease (IHD) wasobserved in 15.0% of patients, indicating a notable overlap between cerebrovascular and cardiovascular conditions. Other co-morbidconditions contributed to asmall portion (8.3%)

Table 6: Distribution of Smoking

Variable		Frequency (n)	Percent (%)
Smoking	Absent	62	84.9
	Present	11	15.1
	Total	**73**	**100.0**

Figure 6: Distribution of smoking

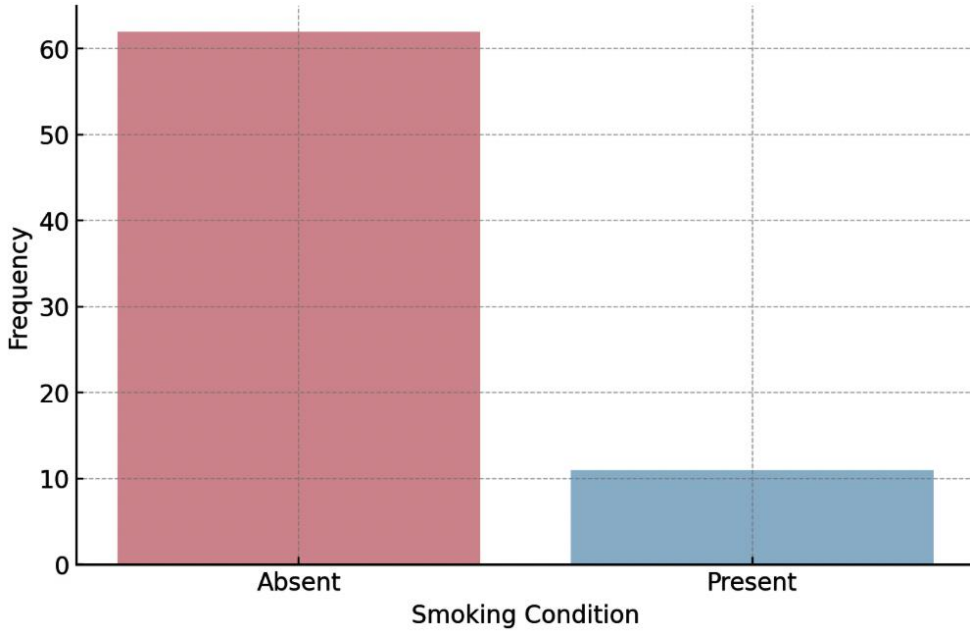


Table 6 and Figure 6 presents the distribution of smoking among the study participants. Out of the 73 participants, 62 individuals (84.9%) did not smoke. In contrast, 11 participants (15.1%) were smokers.

Table 7: Distribution of tobacco chewing

Variable		Frequency (n)	Percent (%)
Tobacco chewing	Absent	56	76.7
	Present	17	23.3
	Total	**73**	**100.0**

Figure 7: Distribution of tobacco chewing

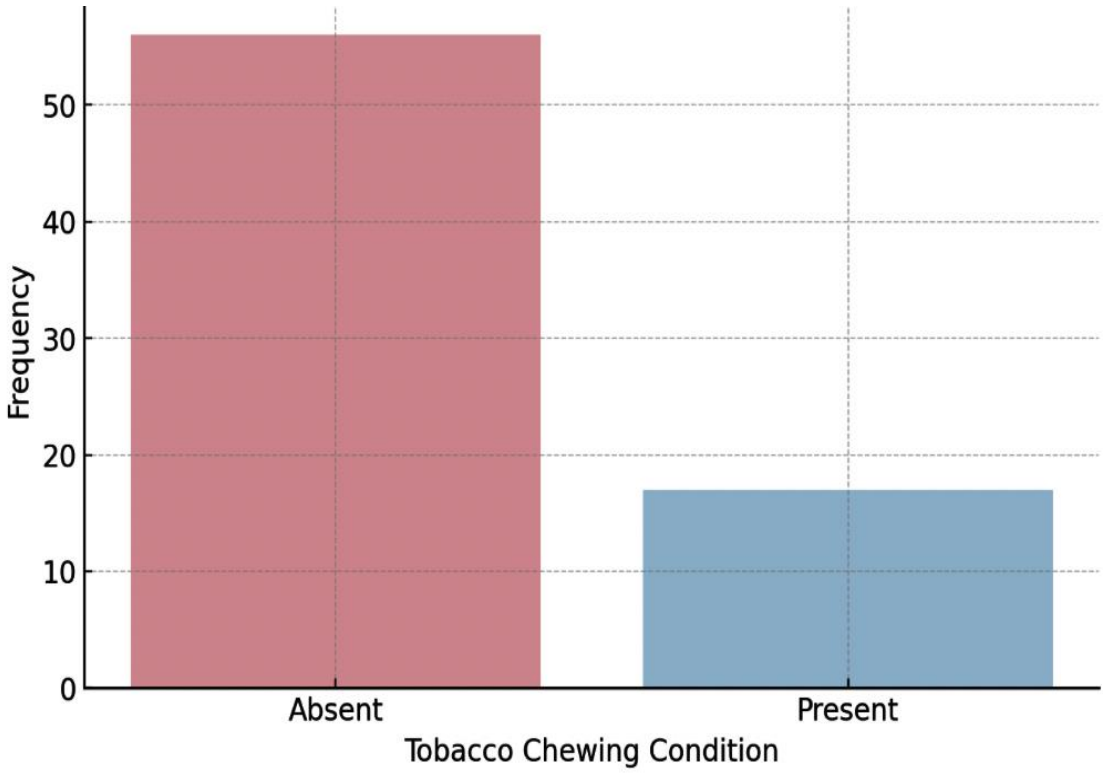


Table 7 and Figure 7 shows the distribution of tobacco chewing among the study participants. Out of the 73 participants, 56 individuals (76.7%) did not chew tobacco, while 17 participants (23.3%) reported chewing tobacco.

Table 8: Distribution of Alcohol Consumption

Variable		Frequency (n)	Percent (%)
Alcohol	Absent	44	60.3
	Present	29	39.7
	Total	**73**	**100.0**

Figure 8: Distribution of Alcohol Consumption

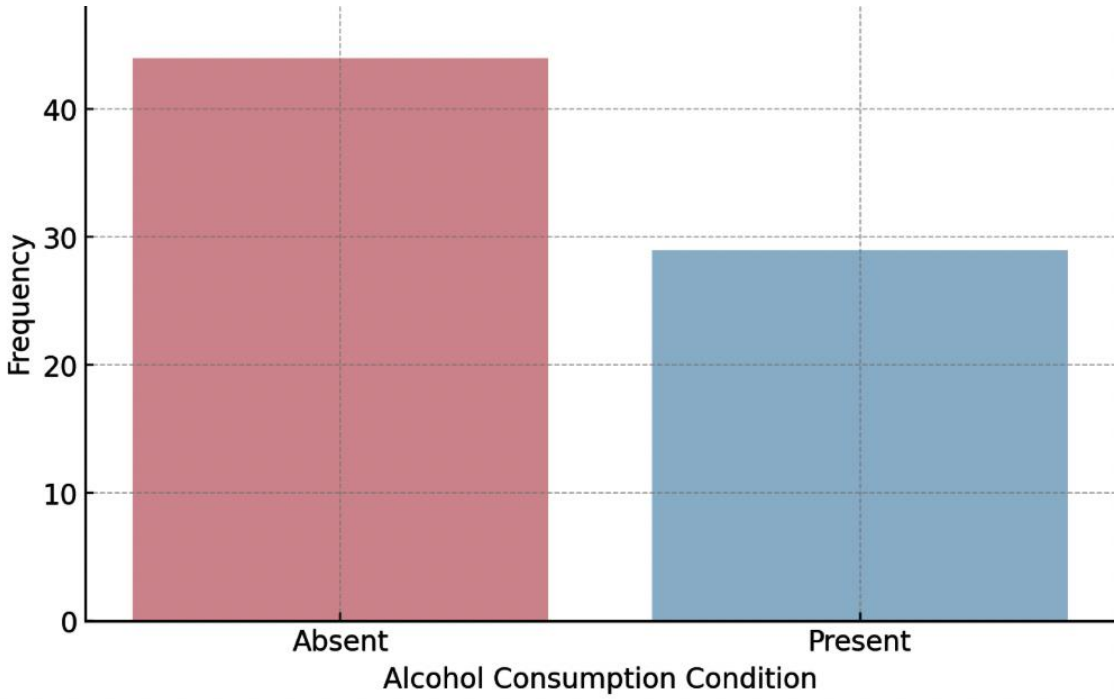


Table 8 and Figure 8 depicts the distribution of alcohol consumption among the study participants. Out of 73 participants, 44 individuals (60.3%) did not consume alcohol, while 29 participants (39.7%) reported consuming alcohol.

Table 9: Distribution of Prognosis

Variable		Frequency (n)	Percent (%)
Prognosis	Alive	44	60.3
	Death	28	38.4
	Lost to follow up	1	1.4
	Total	**73**	**100.0**

Figure 9: Distribution of Prognosis

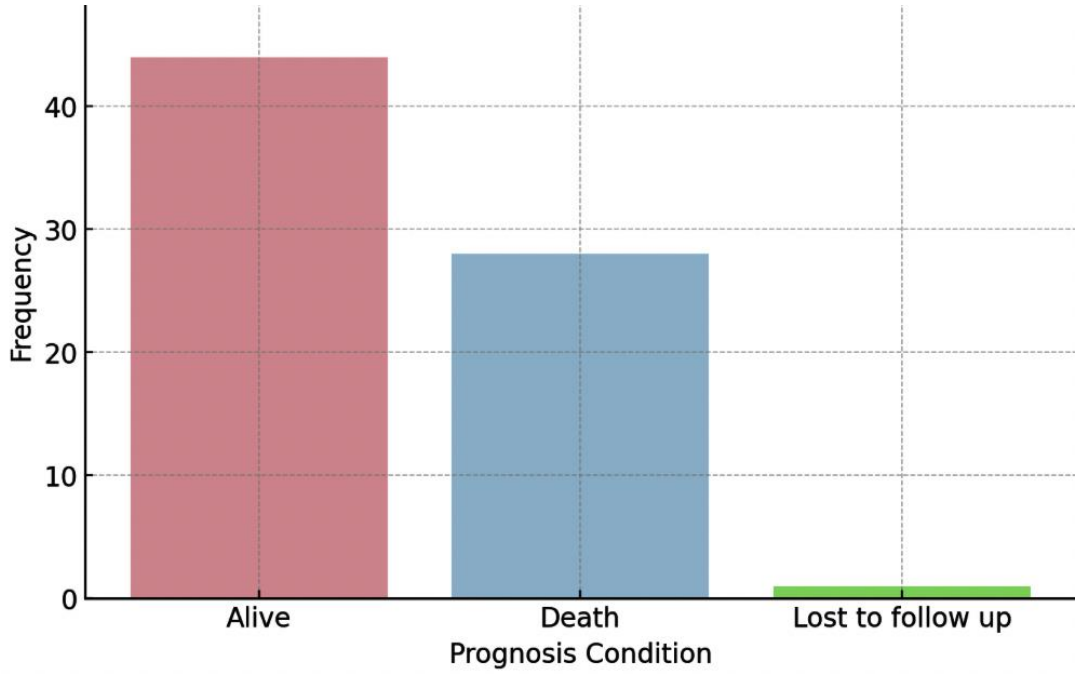


Table 9 and Figure 9 shows the distribution of prognosis among the study participants. Out of 73 participants,majority of participants, 44 (60.3%), survivedtill the end of study. A significant proportion, 28 participants (38.4%), passed away during the study. Only 1 participant (1.4%) was lost to follow-up.

Table 10: Association between ICH score and HTN duration

		ICH score						Total	Pvalue
		0	1	2	3	4	5		
HTN Duration (years)		1	3	2	2	2	0	10	0.19
	0	4	2	1	1	1	0	9	
	0.1	4	1	2	0	2	1	10	
	0.6	1	0	0	0	0	0	1	
	0.83	0	0	0	1	0	0	1	
	1	0	3	0	2	0	1	6	
	10	0	1	0	1	1	0	3	
	13	0	0	0	1	0	0	1	
	15	1	0	0	1	1	0	3	
	2	1	0	1	1	3	0	6	
	24	0	1	0	0	0	0	1	
	25	0	0	0	0	0	1	1	
	3	0	0	0	3	0	0	3	
	30	0	0	0	1	0	0	1	
	4	2	1	1	0	1	1	6	
	5	2	2	1	0	1	0	6	
	6	0	0	2	0	0	0	2	
	7	0	1	0	0	0	1	2	
	8	1	0	0	0	0	0	1	
Total		17	15	10	14	12	5	73	

Table 10 shows the association between ICH (Intracerebral Hemorrhage) score and the duration of hypertension (HTN) in years. The data is grouped by the number of years a participant has had hypertension and the corresponding ICH scores are presented.The p-value of 0.19 suggests that there is no statistically significant association between the duration of HTN and the ICH score. Thus implying that the length of time a participant had hypertension, does not strongly correlate with the severity of their ICH score in this study.

Table 11: Association between ICH score and Prognosis

		ICH score						Total	Pvalue
		0	1	2	3	4	5		
Prognosis	Alive	17	15	7	4	1	0	44	<0.01*
	Death	0	0	3	9	11	5	28	
	Lost to follow up	0	0	0	1	0	0	1	
Total		17	15	10	14	12	5	73	

Graph 10: Association between ICH score and Prognosis

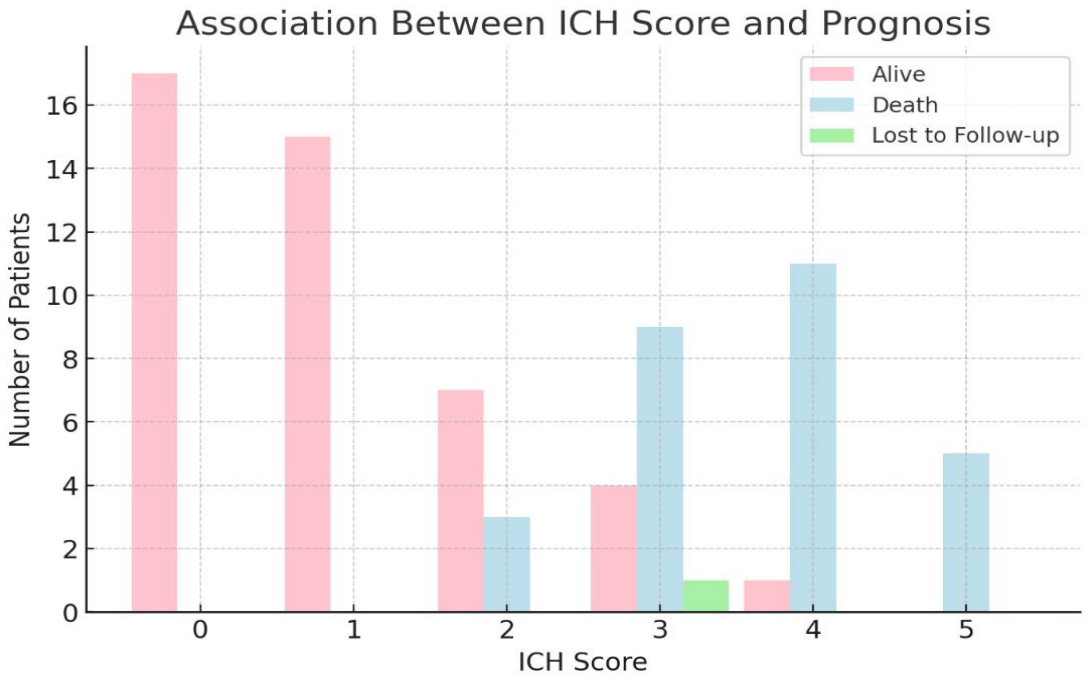


Table 11and graph 10 shows the association between prognosis (alive, death, or lost to follow-up) and the ICH (Intracerebral Hemorrhage) score. Among the 73

participants, those who were survived (44 individuals) majority of them had a ICH score of 0 (17 participants), followed by 15 participants who had a score of 1 and 7 had a score of 2.

There were fewer participants with higher scores, 4 participants had a score of 3, 1 had a score of 4, and no participants had a score of 5. Amongst participants who succumbed to death (28 individuals), the distribution was more towards higher ICH scores, 3 participants had a score of 2, 9 had a score of 3, 11 had a score of 4 and 5 participants had a score of 5. There was only 1 participant who was lost to follow-up, with a score of 3.The p-value of <0.01 indicates a statistically significant association between prognosis and ICH score, suggesting that a higher ICH score is strongly associated with a greater likelihood of death or being lost to follow-up.

Table 12: Association between Gender and ICH score

		ICH score						Total	Pvalue
		0	1	2	3	4	5		
Gender	Male	14	10	7	6	8	5	50	0.14
	Female	3	5	3	8	4	0	23	
Total		17	15	10	14	12	5	73	

Graph 11: Association between Gender and ICH score

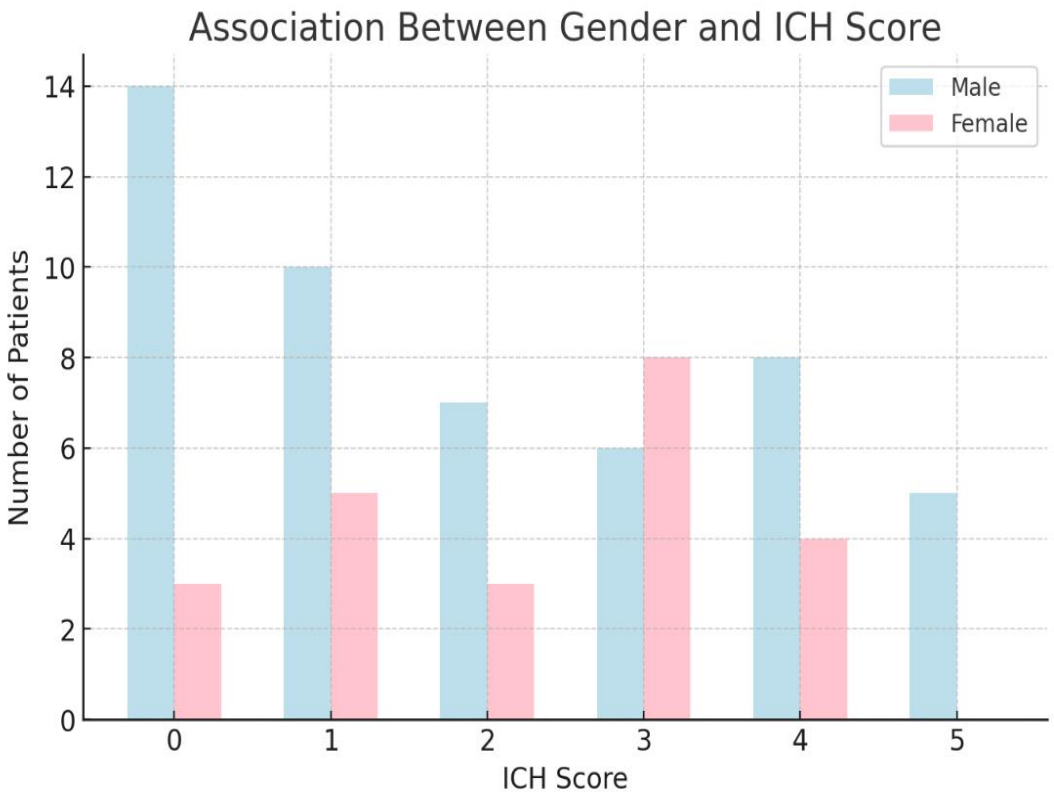


Table 12and graph 12 shows the association between gender and the ICH (Intracerebral Hemorrhage) score. Amongst the male participants (50 individuals) 14 had a score of 0, 10 had a score of 1, 7 had a score of 2, 6 had a score of 3, 8 had a score of 4and 5 had a score of 5. Amongst Female participants (23 individuals), the distribution was more spread across the scores, with 3 participants had a score of 0, 5 had a score of 1, 3 had a score of 2, 8 had a score of 3, 4 had a score of 4, and no participants had a score of 5.The p-value of 0.14 suggests that there is no statistically significant association between gender and the ICH score, indicating that gender does not have a strong correlation with the severity of ICH in this study.

Table 13: Association between GCS score and Prognosis

		Prognosis			Total	Pvalue
		Alive	**Death**	**Lost to follow up**		
GCS Score	3-4	0	8	0	8	**<0.01***
	5-12	18	20	1	39	
	13-15	26	0	0	26	
Total		44	28	1	73	

Graph 12: Association between GCS score and Prognosis

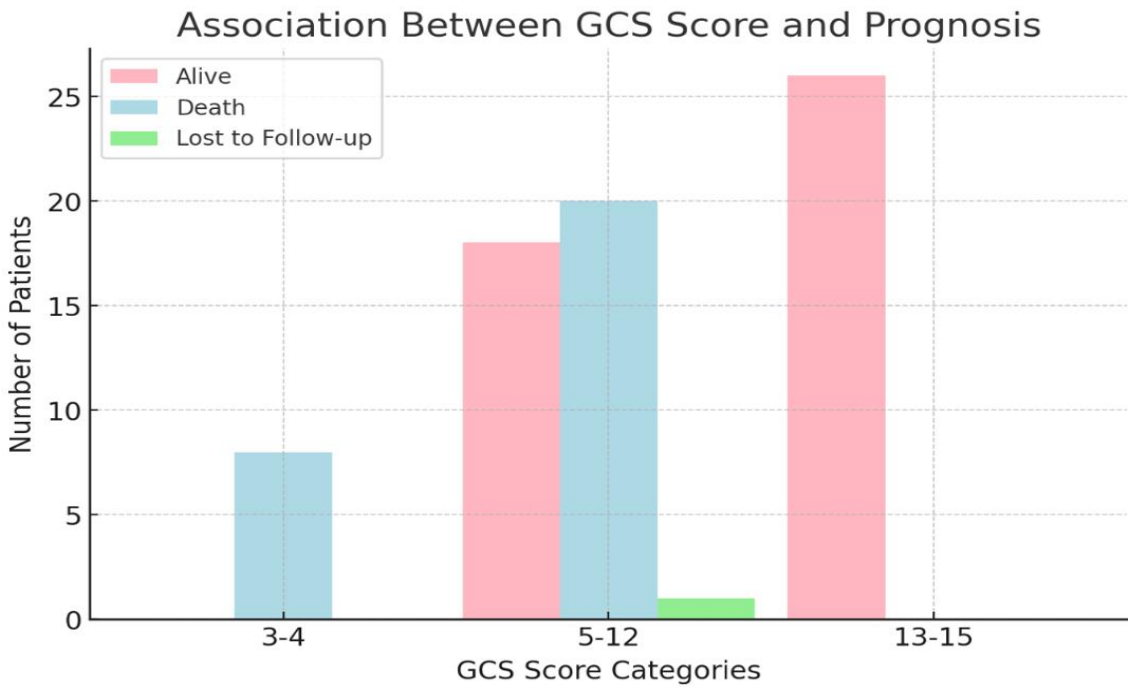


Table 13 and graph 13 presents the association between GCS (Glasgow Coma Scale) score and prognosis (alive, death, or lost to follow-up). Patients with the lowest GCS scores (3-4) had a 100% mortality rate, indicating a very poor prognosis. In the

moderate GCS category (5-12), nearly half of the patients (46.2%) survived and 51.3% died. One patient was lost to follow-up. In contrast, all patients with a GCS score of 13-15 survived, showing a strong correlation between higher GCS scores and better outcomes. The p-value (<0.01) suggests that this association is statistically significant, emphasizing that lower GCS scores are predictive of worse outcomes in patients.

Table 14: Association between ICH volume and Prognosis

		Prognosis			Total	Pvalue
		Alive	**Death**	**Lost to follow up**		
ICH volume	<30cm^3	34	2	0	36	<0.01*
	>30cm^3	10	26	1	37	
Total		44	28	1	73	

Graph 13: Association between ICH volume and Prognosis

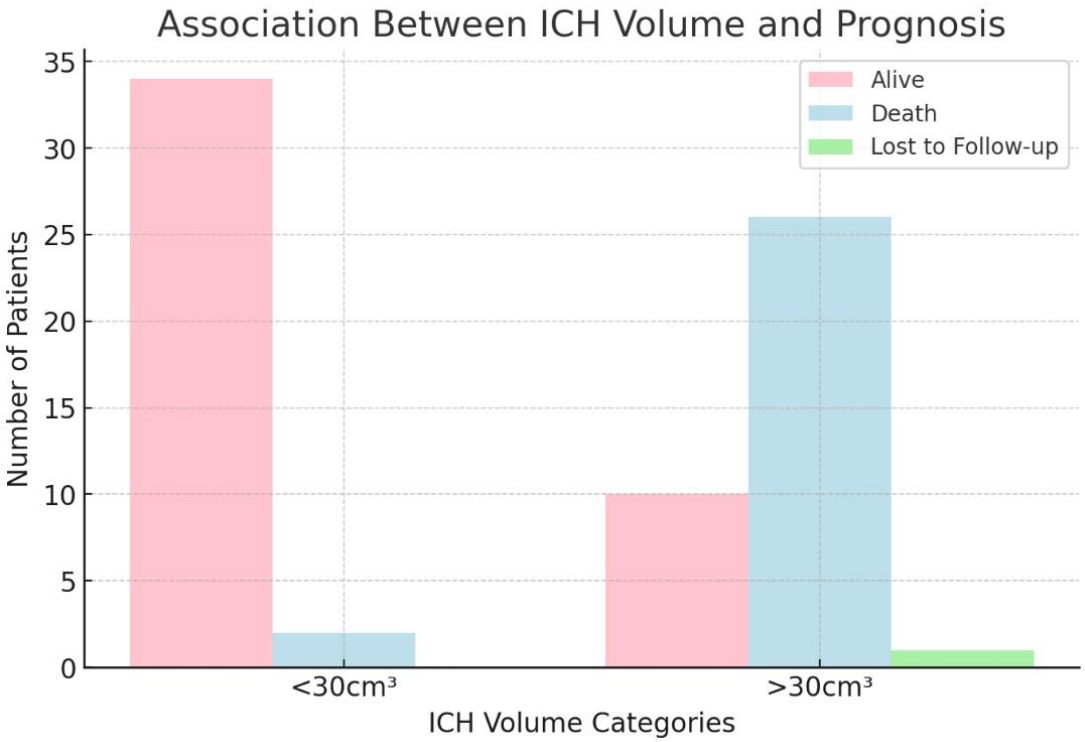


Table 14 and graph 13 presents the association between ICH (Intracerebral Hemorrhage) volume and prognosis (alive, death, or lost to follow-up). It shows a clear correlation between larger ICH volume and poorer outcomes. Among patients with an ICH volume of less than 30 cm^3, 34 out of 36 (94.4%) survived, only 2 deaths occured and no patients were lost to follow-up. In contrast, patients with an ICH volume greater than 30 cm^3 had a significantly higher mortality rate, 26 out of 37 (70.3%) participants succumbed, and only 10 survived. One patient was lost to follow-up. The p-value (<0.01) indicates that this association is statistically significant, suggesting that larger hemorrhage volumes are strongly predictive of worse outcomes, including a higher risk of mortality.

Table 15: Association between IVH and Prognosis

		Prognosis			Total	Pvalue
		Alive	**Death**	**Lost to follow up**		
IVH	Yes	17	26	1	44	<0.01*
	No	27	2	0	29	
Total		44	28	1	73	

Graph 14: Association between IVH and Prognosis

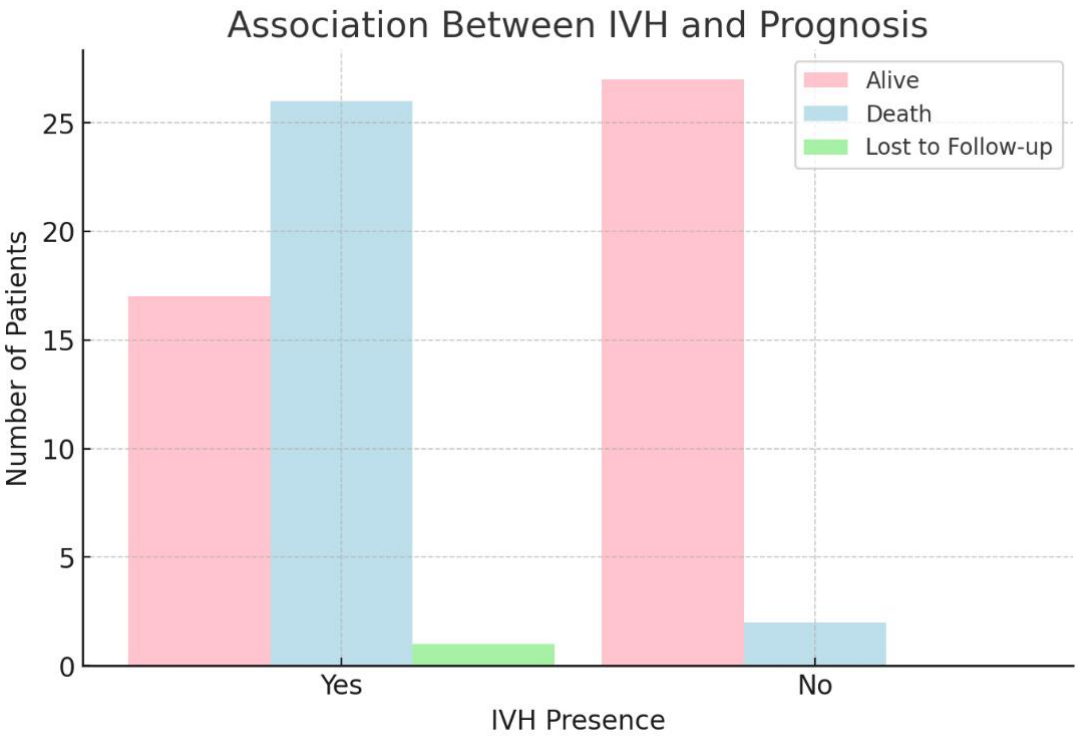


Table 15 and graph 14 presents the association between IVH (Intraventricular Hemorrhage) and prognosis (alive, death, or lost to follow-up). The data indicates a strong correlation between the presence of IVH and worse outcomes. Among patients with IVH, only 17 out of 44 (38.6%) survived, while 26 (59.1%) participants succumbed and one patient was lost to follow-up. In contrast, amongst patients without IVH, 27 out of 29 (93.1%) survived, with only 2 deaths and no patients were lost to follow-up. The p-value (<0.01) signifies that this association is statistically significant. These findings suggest that the presence of IVH is a strong predictor of poor prognosis, with a significantly higher mortality rate compared to those without IVH.

Table 16: Association between Infratentorial origin and Prognosis

		Prognosis			Total	Pvalue
		Alive	**Death**	**Lost to follow up**		
Infratentorial origin	Yes	1	9	0	10	<0.01*
	No	43	19	1	63	
Total		44	28	1	73	

Graph 15: Association between Infratentorial origin and Prognosis

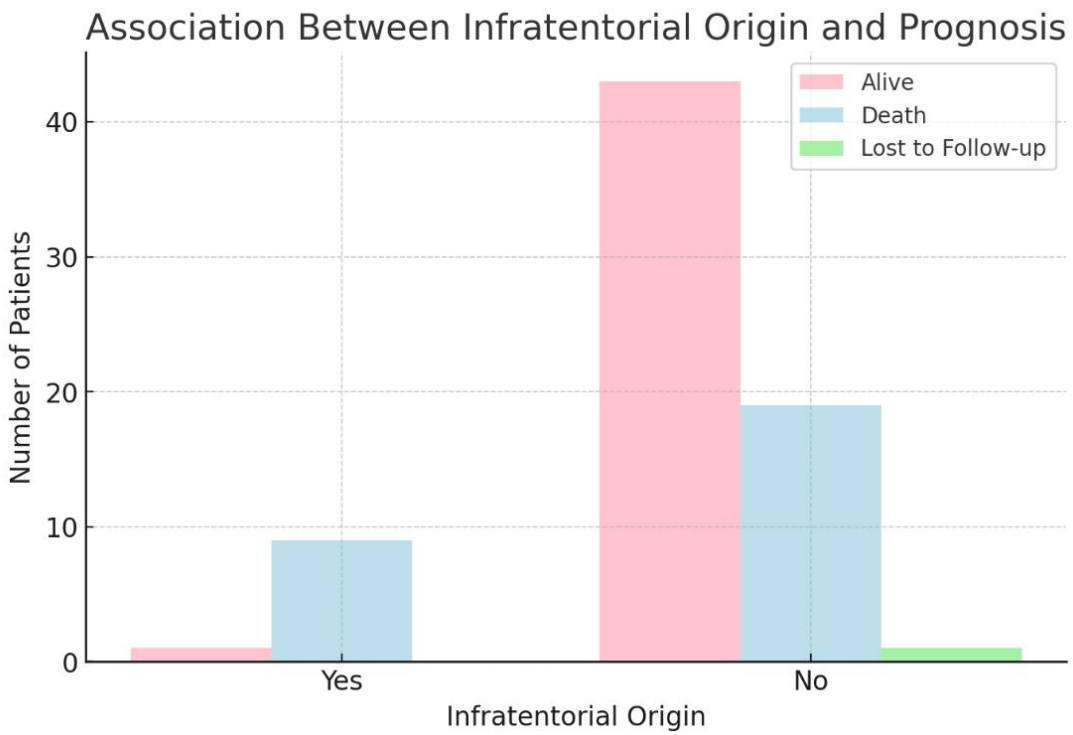


Table 16 and graph 16 presents the association between infratentorial origin and prognosis (alive, death, or lost to follow-up). Among patients with infratentorial haemorrhage (n=10), only 1 survived, while 9 succumbed, indicating a high mortality rate in this group.Among patients with supratentorial haemorrhage (n=63), 43 survived, 19 succumbed and 1 was lost to follow-up, suggesting a better survival rate in this group.The statistical analysisshowed a P-value of <0.01 thus suggesting that there is poor prognosis in haemorrhage of infratentorial origin with a notably higher risk of death compared to those with supratentorial haemorrhage.

Table 17: Association between Age group and Prognosis

		Prognosis			Total	Pvalue
		Alive	Death	Lost to follow up		
Age Group	≤80	41	27	1	69	0.81
	>80	3	1	0	4	
Total		44	28	1	73	

Graph 16 : Association between Age group and Prognosis

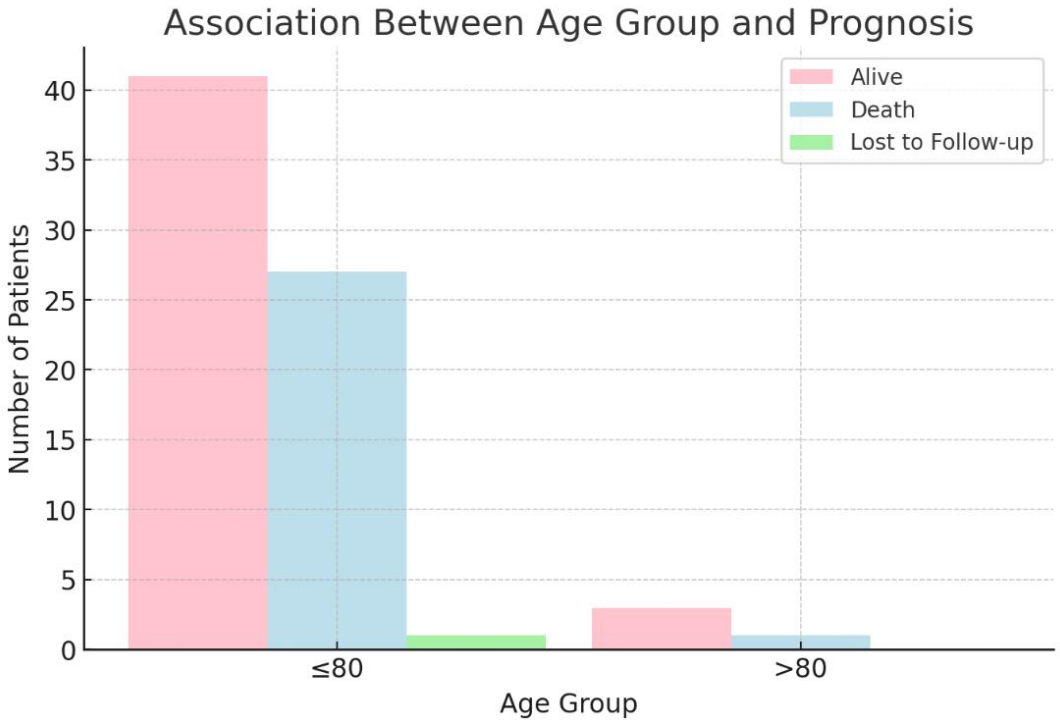


Table 17 and Graph 16 presents the association between age group and prognosis (alive, death, or lost to follow-up). Among 73 participants, 69 individuals were≤80 years (69 individuals). 41 participants survived, 27 succumbed and 1 was lost to follow-up. In contrast, participants aged >80 years (4 individuals), 3 individuals survived and 1 succumbed. No participants were lost to follow-up. The p-value of 0.81 suggests that there is no statistically significant association between age group and prognosis. Thus indicating that age, whether ≤80 or >80 years, did not strongly influence the likelihood of survival, death, or being lost to follow-up.

DISCUSSION

Intracerebral hemorrhage (ICH) is a serious medical condition that accounts for 10-15% of all strokes, but it causes a disproportionate amount of stroke-related mortality and long-term disability.[1] Accurate prediction of patient outcomes is crucial for determining the appropriate clinical approach. The ICH score, which incorporates independent factors like Glasgow Coma Scale (GCS), age, ICH volume, intraventricular hemorrhage (IVH) and infratentorial origin, has been shown to be a reliable tool for predicting mortality in ICH patients.[4] This study aimed to evaluate the association between these factors and patient outcomes. It also confirmed the relevance of the ICH score in predicting 30-day mortality and functional recovery. Our findings closely align with the results of several prior studies, which have also demonstrated the predictive power of the ICH score in various populations.[4]

In the study conducted by **Hemphill et al**(2001), the original ICH score was introduced as a simple tool to predict mortality based on five independent factors: GCS, age, ICH volume, IVH, and infratentorial origin.[4] Their study showed a clear relationship between higher ICH scores and increased mortality. In patients who scored 5 on the ICH scale had a 100% mortality rate. Our study supports these findings, as we also observed that patients with higher ICH scores (4 and 5) had a higher mortality rate, reinforcing the value of the ICH score as a prognostic tool. In our cohort, we found that a high ICH score was associated with increased mortality, which mirrors the results from **Hemphill et al.** It further validates the ICH score's utility in clinical settings.[4,5]

Similarly, **Cheung and Zou** et Al (2003) examined the effectiveness of the ICH score in predicting both mortality and morbidity.[4] They found that, the tool was a reliable predictor for short-term outcomes. They also explored the modification of the ICH score by replacing the GCS with the National Institutes of Health Stroke Scale (NIHSS), which showed a slight improvement in predicting good outcomes but did not significantly change mortality predictions. Our study similarly found that, the GCS score remained a reliable measure in predicting mortality, supporting the use of the original ICH score for outcome prediction. This suggests that while modifications to the ICH score might offer some benefits, the traditional components of the score, especially GCS, remains essential for accurate prognosis.[17]

The role of the GCS in ICH prognosis is emphasized in the study by **Hwang et al.** (2010), which discussed various ICH grading scales.[40] They highlighted the importance of clinical scales like the ICH score in providing standardized assessment and guiding treatment protocols. In our study, we observed that patients with lower GCS scores had higher ICH scores, which aligns with **Hwang et al.**'s assertion that neurological status is a critical factor in determining outcomes. This further emphasizes the importance of early assessment using standardized grading scales like the ICH score. This can aid clinicians quickly stratify patients based on their risk and guide prompt management decisions.[40]

In addition to validating the ICH score, our study also examined other factors such as comorbidities, including hypertension, diabetes, and ischemic heart disease, which are known risk factors for stroke. However, unlike some previous studies such as **Nisar et al.** (2018), which found that hypertension significantly influenced ICH outcomes,[5] we did not observe a statistically significant association between these comorbidities and ICH severity. This may be due to differences in the patient

populations or variations in treatment approaches, as our study population had a diverse range of patients with varying levels of access to care. Nevertheless, our findings suggest that hypertension is a well-known risk factor for stroke, its direct impact on ICH severity may not always be evident when other clinical factors, such as ICH volume and GCS are taken into account.

The importance of ICH volume in predicting outcomes was highlighted in several studies, including **Ilyas and Chavan**(2021), who found that larger hematomas were associated with worse outcomes.[22] Our study also found that ICH volume was strongly correlated with mortality, with larger hemorrhages leading to poorer prognosis. The presence of IVH, which was another factor strongly linked to poor outcomes in studies conducted by **Hemphill et al.**[4] and **Nisar et al**[5]**. In our study, IVH was associated with** higher ICH scores in our study. These findings underscore the importance of imaging parameters, such as hematoma volume and IVH, in predicting patient outcomes. The use of such parameters alongside clinical assessments can provide a more comprehensive view of patient prognosis and guide treatment strategies.

The present study, further examined the impact of infratentorial hemorrhage on patient outcomes, confirming that its presence is significantly associated with increased mortality and poorer prognosis. Infratentorial ICH, due to its involvement in critical brainstem functions, had a much higher mortality rate among affected patients. This finding aligns with the recent study by Pezzini et al. (2023), which identified hematoma expansion (HE) as a key predictor of mortality in infratentorial ICH. Their study demonstrated that, patients with early hypodensities on noncontrast CT and presentation within three hours of symptom onset had significantly higher rates of HE, which in turn was independently associated with increased mortality. These

findings reinforce the present study's conclusion that early identification and monitoring of infratentorial ICH are crucialand interventions should focus on mitigating hematoma expansion to improve outcomes.

Similarly, the presence of IVH at admission strongly correlated with higher mortality in the present study.The patients with IVH had lower survival rates and high mortality. This supports that IVH complicates the clinical course of ICH due to obstructive hydrocephalus and increased intracranial pressure, necessitating closer monitoring and potential neurosurgical intervention. The findings align with the review by Carhuapoma et al. (2024). Their work suggests that prolonged supportive care may allow functional recovery even in patients initially presenting with severe disability, challenging the conventional assumption that IVH-associated ICH leads to universally poor outcomes. The present study, adds to this discussion by confirming the need for comprehensive long-term management strategies for IVH-related ICH, rather than early withdrawal based solely on baseline severity factors.

While the ICH score provides a useful framework for predicting mortality, our study also noted the limitations of the scoring system. As seen in **Gupta et al.** (2017), variations in outcomes among patients with moderate ICH scores (3 and 4) suggest that the ICH score may not always be fully accurate in predicting individual outcomes, particularly with advances in treatment and management.[16] For example, patients with high ICH scores may still survive with aggressive medical intervention, such as blood pressure management, coagulopathy reversal, and surgical interventions. The evolving nature of ICH treatment, including minimally invasive surgery and new pharmacological therapies, means that the ICH score should be used combined with clinical judgment and patient-specific factors to guide management.

STRENGTH

1. Use of a Well-Established and Validated Clinical Scoring System

- The ICH score is simple, reliable, and widely accepted.
- Easily applicable in resource-limited settings, where advanced diagnostic tools are unavailable.

2. Application of the ICH Score

- Highlights its utility in predicting patient outcomes in real-world clinical practice.

3. Prospective Cohort Study Design

- Real-time data collection improved accuracy and relevance.
- Minimized recall bias, enhancing the study's credibility.

4. Comprehensive Follow-Up Approach

- Follow-ups included phone calls for early discharges, reducing loss to follow-up.
- Helped in capturing more accurate outcome data.

LIMITATIONS

1. Small Sample Size (73 Participants)

- Limits the generalizability of the findings to larger cohorts.

2. Single-Center Study

- Potential bias due to regional healthcare practices, demographics, and hospital-specific resources.

3. Focus on a Tertiary Care Setting

- The reliability of ICH scoring less severe cases that did not require hospitalization could not be assessed in this study.

4. Timing of CT Scans

- Possible variations in the timing of imaging, could impact the accuracy of data collection.

CONCLUSION

The results of this study affirm the utility of the Intracerebral Hemorrhage (ICH) score as a reliable tool for predicting patient outcomes, specifically the 30-day mortality following intracerebral hemorrhage (ICH). The data reveal a strong correlation between higher ICH scores and poorer prognosis, with mortality rates increasing as the score rises. The study highlighted that factors such as Glasgow Coma Scale (GCS) score, hematoma volume, and intraventricular hemorrhage significantly impact the severity of the condition and the likelihood of adverse outcomes, such as death or severe disability. Notably, patients with higher ICH scores, particularly those with scores of 4 or 5, exhibited a markedly increased risk of death or discharge against medical advice, emphasizing the predictive accuracy of the ICH score. These findings are consistent with existing literature, reinforcing the ICH score's ability to effectively stratify patients based on their mortality risk and guide clinical decision-making. Furthermore, the results support the integration of the ICH score into routine clinical practice, particularly in settings with limited resources, where it can enhance treatment protocols and outcomes.

SUMMARY

This study aimed to evaluate the utility of the Intracerebral Hemorrhage (ICH) score in predicting 30-day mortality and assessthe severity of outcomes in patients diagnosed with intracerebral hemorrhage (ICH). ICH is a devastating form of stroke that results in high mortality and long-term disability. While various clinical grading scales exist to assess ICH severity, the ICH score remains one of the most widely used tools due to its simplicity and reliability.

The primary objective of this study was to determine how well the ICH score could predict patient outcomes, specifically focusing on 30-day mortality. The ICH score incorporates five key clinical variables: the Glasgow Coma Scale (GCS), age, the presence of intraventricular hemorrhage (IVH), ICH volume, and the location of the hemorrhage (whether it originates in the infratentorial region). Each of these factors is assigned a score that contributes to the overall ICH score, which ranges from 0 to 5. Higher scores correspond to a greater likelihood of adverse outcomes, including death.

The study was conducted in a tertiary care setting in Belagavi, India, where patients were assessed for GCS, ICH volume, IVH presence, and infratentorial origin, following the standard parameters used in the ICH score.The study involved a cohort of 73 patients who were admitted to the emergency department with confirmed ICH. The data was collected prospectively and 30-day mortality was used as the primary outcome measure. Additional outcomes such as weakness, altered sensorium, and speech disturbances were also monitored to assess functional recovery.

The results of the study indicated that the ICH score was highly predictive of 30-day mortality. Patients with higher ICH scores (particularly those scoring 4 or 5) had significantly higher mortality rates. The presence of higher GCS scores (indicating better neurological function), smaller hematomas, absence of Intraventricular haemorrhageand infratentorial haemorrhage were all associated with better survival outcomes. Conversely, those with larger hematomas, lower GCS scores and the presence of IVH or infratentorial hemorrhages had a greater likelihood of death, within the 30-day period.

The study also explored the role of comorbid conditions such as hypertension, diabetes, and ischemic heart disease in influencing ICH severity. While hypertension is a known risk factor for ICH, our findings suggested that it did not have a statistically significant direct impact on the mortality of patients as compared to other factors, such as hematoma size and GCS scores. This aligns with findings from some studies, which have highlighted that the severity of the hemorrhage, rather than comorbidities alone, plays a more critical role in determining the patient's prognosis.

The study highlighted the importance of using the ICH score as a risk stratification tool in clinical practice. Especially inlimited resources settings, where early and accurate prognosis prediction can guide treatment decisions. By providing an objective framework for assessing ICH severity, the ICH score helps prioritize patients who may need more aggressive interventions and those who might benefit from conservative management.

Despite the study's valuable insights, there were limitations in its design. The relatively small sample size (73 patients) and the fact that the study was conducted in a single hospital may limit the generalizability of the findings to larger or more

diverse populations. Additionally, the study did not consider long-term outcomes beyond 30 days, which could provide more comprehensive insights into the effectiveness of the ICH score in predicting functional recovery and disability.

The present study affirms that, the ICH score is a simple, reliable, and effective tool for predicting 30-day mortality in patients with intracerebral hemorrhage. It reinforces the significance of clinical variables such as GCS, hematoma volume, IVH, and infratentorial hemorrhage in assessing prognosis. This study's findings contribute to the growing body of evidence, supporting the use of the ICH score as a standard tool in clinical practice. It also emphasizes its potential, to improve patient outcomes through better risk stratification and more informed clinical decision-making. Further studies, with largermulti-center cohorts and long-term outcome measures are needed, to validate and potentially refine the ICH score for broader use in diverse patient populations.

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ANNEXURES

ANNEXURE – I - INFORMED CONSENT FORM

"TO STUDY THE PROGNOSIS OF PATIENTS WITH INTRACEREBRAL BLEED USING ICH SCORE, ONE YEAR PROSPECTIVE OBSERVATIONAL STUDY AT TERTIARY CARE HOSPITAL, BELAGAVI"

Name of Student/Principal Investigator:

Name of Guide/Co Investigators:

1.1 Introduction and Need for the study:

Spontaneous Intracerebral Haemorrhage (SICH) is the second most common cause of stroke and accounts for 7.5−30% of all strokes .Haemorrhagic stroke is generally associated with higher morbidity and mortality rates than ischemic stroke. Only one-fifth of the patients regain functional independence after Spontaneous Intracerebral Haemorrhage (SICH) and between one-fourth to half of the patients succumb to the bleed. Optimal management is controversial, and considerable debate exists primarily on the role of surgery in SICH[1].

The ICH Score is a clinical grading scale that allows for risk stratification of patients presenting with ICH. The 5 categories are independent predictors of 30-day mortality. Mortality rises as the ICH Score increases. The use of the ICH Score could improve standardization of treatment protocols and clinical research studies in ICH. This score is calculated by taking the patient's level of consciousness based on Glasgow Coma Scale (GCS), hemorrhage volume (cm3), presence or absence of intraventricular hemorrhage, hemorrhage site (supra or infratentorial), and patient's age (less or more than 80 years).[3]

- NEED FOR STUDY:

To be generally applicable, a clinical grading scale must be simple enough to use without significant special training, statistical knowledge, or extensive time commitment. It also must be reliable in patient stratification and should be composed of elements that are associated with outcome and that would likely be assessed, in general, as part of routine clinical care. In essentially every clinical grading scale there exists a compromise between simplicity and accuracy of outcome prediction. To strike the appropriate balance between these 2 factors, the general purpose of the grading scale must be considered.

The ICH Score is a clinical grading scale composed of factors related to a basic neurological examination (GCS), a baseline patient characteristic (age), and initial neuroimaging (ICH volume, IVH, infratentorial/supratentorial origin). The purpose of this grading scale is to provide a standard assessment tool that can be easily and rapidly determined at the time of ICH presentation by physicians without special training in stroke neurology and that will allow consistency in communication and treatment selection in clinical care and clinical research.[2]

In developing countries like India with severe resource constraints, treatment strategies need to be customised given the high morbidity and mortality associated with Spontaneous intracerebral haemorrhage[1]

REFERECE

1. Hegde A et al. Clinical Profile and Predictors of Outcome in Spontaneous Intracerebral Hemorrhage from a Tertiary Care Centre in South India. Stroke Res Treat. 2020 Jan 27;2020:2192709. doi: 10.1155/2020/2192709. PMID: 32411342; PMCID: PMC7204327.

2. Hemphill JC 3rd et al. The ICH score: a simple, reliable grading scale for intracerebral hemorrhage. Stroke. 2001 Apr;32(4):891-7. doi: 10.1161/01.str.32.4.891. PMID: 11283388.
3. Sembill JA et al Multicenter Validation of the max-ICH Score in Intracerebral Hemorrhage. Ann Neurol. 2021 Mar;89(3):474-484. doi: 10.1002/ana.25969. Epub 2020 Dec 21. PMID: 33222266.

Explanation of procedure:

- A total of 67 patients with primary ICH who were referred and hospitalized in the emergency department of medicine tertiary care hospital belagavi,were enrolled. Sampling was done as a full census.
- CT Brain was done within 24 to 48 hours of admission to hospital
- Calculate ICH score
- Follow up the pt till discharge or death, then 30 days from date of admission to know prognosis

Withdrawal from participation in the study: Participation in this study in voluntary. You will be free to decide whether to participate in this study or continue participation once enrolled. In case you decide to withdraw your participation, you are free to do so. However, please convey the decision to the principal investigator.

Possible benefits from participating in the study: You will get any benefits by participating in this study. As early diagnosis will be helpful to determine further course of treatment**.** The data gathered will help population at large.

Possible risks from participating in the study: There are no risks involved in participating in this study.

Privacy and confidentiality: The information collected from you will be coded, to prevent any person to identify you. Your identity will never be revealed. The data

collected from you will be kept confidential and only processed or aggregated data will be used for publication.

Financial incentives: You will not receive any payment for participating in this study.

Cost of investigations done during the course of study will be paid by the principal investigator**.**(Strike out which is not applicable)

Authorization for publication of aggregated data: Results obtained after processing of the aggregated data will be published for scientific purpose and or presented to scientific groups. However, your identity will never be revealed.

Questions: If you have any question or complaints with regard to your right as study participant you may contact Dr Harsha Hegde, Chairperson, Ethical committee of JNMC, 0831-2473777 Extension 4052.

Legal rights: By signing this consent form, we are not waving any of your legal rights

CONSENT STATEMENT

I am making a voluntary decision to participate in the study **"TO STUDY THE PROGNOSIS OF PATIENTS WITH INTRACEREBRAL BLEED USING ICH SCORE, ONE YEAR PROSPECTIVE OBSERVATIONAL STUDY AT TERTIARY CARE HOSPITAL, BELAGAVI"** My signature below indicates that I have decided to participate and I have read the information provided above or the information provided.. above has been read to me in the language that I understand best. I was given the opportunity to ask questions and that they have been answered to my satisfaction.

Name of the participant:

Signature or left thumb impression of the participant:

Name of the witness:

Signature or left thumb impression of the witness:

Name of the investigator:

Signature of the investigator:

ANNEXURE – II - PROFORMA

"TO STUDY THE PROGNOSIS OF PATIENTS WITH INTRACEREBRAL BLEED USING ICH SCORE AT TERTIARY CARE HOSPITAL, BELAGAVI"

CASE NO:

NAME:

AGE/SEX:

IP NO.:

ADDRESS:

OCCUPATION:

COMPLAINTS AT PRESENTATION:

SYMPTOMS	**DURATION**	**SYMPTOMS**	**DURATION**
1.HEADACHE			
2.VOMITING			
3.SEIZURE			
4. LOSS OF CONSCIOUSNESS			
5.HYPOXIA			

Past history:

Co-morbidities

DM		HTN		HYPOTHYROIDISM		CKD		CLD		CVA		Malignancy	
Others													

Drug history:

Personal history:

Family history:

PHYSICAL EXAMINATION:

GENERAL CONDITION:

PALLOR		CLUBBING	
ICTERUS		PEDAL EDEMA	
CYANOSIS		LYMPHADENOPATHY	

VITALS:

TEMPERATURE		R.R	
P.R		B.P	

LAB PARAMETERS AT ADMISSION:

COMPLETE BLOOD COUNT				RENAL FUNCTION TESTS	
Hemoglobin				BLOOD UREA	
TOTAL LEUKOCYTE COUNT				S. CREATININE	
DIFFERENTIAL LEUKOCYTE COUNT				S. SODIUM	
Neutrophils		HbA_1C		S. POTASSIUM	
Lymphocytes		RBS		S. BICARBONATE	
Eosinophils				S. CHLORIDE	
Monocytes				NEUTROPHIL LYMPHOCYTE RATIO	
Basophils					
PLATELET COUNT					

LIVER FUNCTION TESTS		COAGULATION PROFILE	
Total Bilirubin		PT	
Direct Bilirubin		APTT	
AST(aspertate transaminase)		INR	
ALT (alanine transaminase)			
ALP(alkaline phosphatase)			
Total Protein			
S. Albumin			

At admission:

- HR -
- SPO2 –
- BP –
- GCS -

SYSTEMIC EXAMINATION:

R. S:

C.V.S:

C.N.S:

P.A:

RADIOLOGICAL EXAMINATION:

CT BRAIN

INTRACEREBRAL HAEMORRHAGE VOLUME **INTRA VENTRICULAR HAEMORRHAGE** **INFRATENTORIAL ORIGIN OF INTRACEREBRAL HAEMORRHAGE**	

TREATMENT GIVEN:

TREATMENT	**DURATION OF TREATMENT**
MEDICALVB	
SURGERY	
VENTILATOR	

1. Duration of hospital stay

2. O2 Supplementation: yes/no

3. Recovered: YES/NO

4. Improved: YES/NO

5. Death: YES/ NO

6. 30 DAYS FOLLOW UP :

ANNEXURE III – MASTER CHART

SL NO	AGE	GENDER	DOA	DODISC	AMA/ dead	HOSP STAY	Ich score	IP.NO	WEAKNESS	SENSORY ABNORMALITY	altered sensorium	speech disturbances	VOMITING	IMBALANCE	HEADACHE	SEIZURES	HTN	HTN DURAT (years)	DIABESTS	IHD	THYROID	OTHERS	SMOKING	TOBACCO CHEWING	ALCOHOL	PULSE	SBP	DBP	GCS ADM	NEUROIMAGING	vol. adm	IVH adm	infratentorial origin
		0-MALE			0- normal discharge				0-absent	0-absent	0-absent	0- absent	0-no	0-No	0- NO	0-no	0- NO		0- NO	0-NO	0-NORMAL		0- NO	0- NO	0- NO					1- CT	0- < 30 ml	0-absent	0-absent
		1-FEMALE			1- at request			1- marathi	1-RIGHT	1-right	1-drowsy	1- slurred speech	1- single episode	1- yes	1- yes	1- present	1- YES		1- YES	1- YES	1-HYPOTHYROIDISM		1- YES	1- YES	1- YES					2- MRI	1- > 30 ml	1- present	1- present
					2- AMA				2-left	2-left	2-loss of consciousness	2- inabilty to speak	2- multiple episodes								2- HYPERTHYROIDISM												
					3-death				3- bilateral	3- bilateral		3-couldn't be assessed																					
1	66	0	03.05.2023	06.05.2023	2	4	2	1186809	1	0	0	1	0	0	0	0	0		0	0	0		0	0	0	112	180	100	8	1	0	1	0
2	48	1	09.05.2023	20.05.2023	0	12	1	1187915	1	0	0	2	0	0	0	0	1	7	0	0	0	RA -4	0	0	0	76	180	100	8	1	0	0	0
3	44	0	24.05.2023	29.05.2023	0	6	0	1190998	1	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	90	160	90	15	1	0	0	0
4	43	1	29.05.2023	05.06.2023	0	8	0	1192100	1	1	0	0	0	1	1	0	1		0	0	0	0	0	0	0	86	160	100	15	1	0	0	0
5	62	0	03.06.2023	08.06.2023	0	6	0	1193378	2	0	0	1	0	1	1	0	1	newly diagnosed	1	0	0		0	0	0	66	150	100	15	1	0	0	0
6	90	1	10.06.2023	19.06.2023	0	10	2	1194775	1	0	2	0	2	0	0	0	1	newly diagnosed	0	0	0		0	0	0	60	160	90	7	1,2	0	0	0
7	55	0	17.06.2023	19.06.2023	3	3	5	1196475	0	0	2	0	0	0	0	0	1	7	0	0	0		1	1	0	120	200	100	3	1	1	1	0
8	69	1	22.06.2023	24.06.2023	3	3	4	1197834	1	1	2	0	0	0	0	0	1	4	1	1	0		1	0	1	68	200	120	5	1	1	1	0
9	64	0	25.06.2023	25.06.2023	3	1	4	1198310	0	0	2	0	2	0	0	0	1	15	1	0	0		0	0	1	60	170	90	4	1	1	1	0
10	27	0	09.07.2023	11.07.2023	2	4	4	1201449	1	0	2	2	0	0	0	0	1	newly diagnosed	0	0	0	0	0	0	0	68	130	80	5	1	1	0	1
11	62	0	11.07.2023	12.07.2023	2	4	3	1201449	1	0	2	2	2	0	0	0	0		0	0	0		1	0	1	68	130	80	6	1	1	1	0
12	56	0	14.07.2023	18.07.2023	1	5	1	1202899	2	0	0	0	0	0	0	0	1	1	20	0	0		0	1	1	76	160	90	15	1	0	1	0
13	48	0	19.07.2023	21.07.2023	3	3	4	1203764	3	0	2	2	0	0	0	0	1	5	0	0	0		0	0	1	60	180	100	3	1	1	1	0
14	60	0	20.07.2023	22.07.2023	2	3	4	1204264	0	0	2	3	2	1	0	1	1	2	0	0	0		0	0	1	66	200	120	3	1	1	1	0
15	62	1	20.07.2023	21.07.2023	2	2	3	1204021	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	106	150	90	10	1	1	1	0
16	62	1	20.07.2023	21.07.2023	2	2	3	1204021	1	0	1	2	0	0	0	0	0		0	0	0	0	0	0	0	106	150	90	12	1	1	1	1
17	65	0	20.07.2023	08.08.2023	0	20	1	1204199	2	0	0	0	2	0	0	0	1	4	0	0	0		0	0	0	74	140	100	15	1	0	1	0
18	72	1	22.07.2023	02.08.2023	0	12		1204633	0	0	1	2	0	0	0	1	0	0	0	0	1	dementia	0	0	0	86	160	100	13	1	0	0	0
19	75	0	25.07.2023	27.07.2023	2	3	4	1205244	0	0	2	3	2	1	0	0	0		0	0	0	0	1	1	0	56	230	100	4	1	1	1	1
20	59	0	28.07.2023	28.07.2023	3	1	2	7111905	2	0	2	0	0	0	0	0	1	6	1	1	0		0	1	1	96	180	100	3	1	1	1	0
21	63	0	31.07.2023	12.08.2023	0	13	0	1206402	1	0	0	1	0	0	0	0	0	0	0	0	0		0	0	0	70	140	80	14	1	0	0	0
22	45	1	03.08.2023	05.08.2023	2	3	3	1207412	2	0	2	2	2	0	0	0	1	3	0	0	0		0	0	0	120	230	130	5	1	1	1	0
23	51	0	08.08.2023	14.08.2023	0	7	0	1208574	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	62	170	100	15	1	0	0	0
24	60	0	15.08.2023	22.08.2023	3	8	3	10000420	2	0	2	3	2	0	0	0	1	3	0	0	0	0	0	1	1	65	190	100	6	1	1	1	0
25	57	0	19.08.2023	04.09.2023	0	15	1	10001306	1	0	1	1	2	0	0	0	1	5	0	0	0		1	1	1	104	160	90	12	1	0	1	0
26	77	1	20.08.2023	23.08.2023	0	4	0	10001564	2	0	0	0	0	0	1	0	1	5	0	1	0	osteoarthritis	0	0	0	90	160	90	15	2	0	0	0
27	77	1	20.08.2023	21.08.2023	2	2	3	10001560	2	0	1	2	0	1	0	0	1	13	1	1	0		0	0	0	90	160	90	8	1	1	1	0
28	52	0	04.09.2023	12.09.2023	0	9	1	10005029	1	0	0	1	0	1	0	0	1	1	1	1	0	0	0	0	0	82	150	90	15	1	0	1	0
29	46	0	05.09.2023	10.09.2023	0	5	0	10005303	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	80	140	90	15	1	0	0	0
30	55	0	09.09.2023	21.09.2023	0	13	1	10006181	1	0	2	1	0	0	0	0	1	5	1	0	0		0	1	0	98	160	100	12	1	0	1	0
31	70	0	16.09.2023	16.09.2023	3	1	5	10007721	0	0	2	3	0	0	0	1	1	1	0	0	0	0	0	0	0	58	180	100	3	1	1	1	1
32	78	1	20.09.2023	06.10.2023		17	1	10008440	2	0	0	1	2	1	3	0	1	24	0	0	0		0	0	0	96	130	80	14	1	1	0	0
33	75	0	06.10.2023	12.10.2023	2	7	2	10012018	2	0	1	1	2	0	0	0	1	5	0	0	1	0	1	1	1	86	180	100	8	1	0	1	0
34	65	0	08.10.2023	14.10.2023	2	5	2	10012351	1	0	2	3	2	0	0	0	0	0	0	0	0	0	0	1	1	90	160	110	6	1	1	0	0
35	85	1	08.10.2023	10..11.2023	0	34	3	10012449	1	0	1	2	2	0	0	0	1	10	0	0	0	0	1	0	1	98	160	90	9	1	1	1	0
36	73	0	09.10.2023	18.10.2023	1	10	1	10012740	2	0	0	1	2	0	1	1	0	0	0	0	0	0	0	0	1	80	160	100	13	1	1	0	0
37	60	0	14.10.2023	15.10.2023	3	2	4	10013943	3	0	2	3	2	0	0	0	0		0	0	0		1	1	1	102	200	100	3	2	1	1	0
38	39	0	20.10.2023	18.11.2023	0	29	2	10015442	3	0	1	3	0	0	0	0	1	2	0	0	0		0	1	1	88	160	90	10	1	0	0	0
39	64	0	13.10.2023	23.10.2023	0	11	1	10013640	3	0	2	3	1	1	1	0	1	10	1	0	0	osa, bph	1	0	1	80	160	100	10	1	0	1	0
40	50	1	24.10.2023	06.11.2023	0	14	2	10015892	2	0	1	1	2	0	3	0	1	6	0	0	0		0	0	0	92	200	100	11	1		1	0
41	75	0	24.10.2023	09.11.2023	0	17	0	10016932	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	170	100	14	1	0	0	0
42	48	1	28.10.2023	13.11.2023	0	17	3	10016933	2	0	1	1	0	0	0	0	1	1	1	0	0		0	0	0	86	160	100	11	1,2	1	1	0
43	50	0	27.10.2023	03.11.2023	2	7	2	10016758	2	2	1	3	2	0	0	0	0		0	0	0		1	1	1	88	170	90	6	1	1	1	0
44	49	0	28.10.2023	06.11.2023	0	10	0	10016851	2	0	0	1	0	0	1	0	1	15	0	0	0	0	0	0	0	90	150	100	14	1	0	0	0
45	72	1	04.11.2023	24.11.2023	0	20	1	10018335	2	2	1	3	2	0	0	0	0		0	0	0		0	0	0	78	130	90	9	1	0	1	0
46	77	1	13.11.2023	14.11.2023	2	2	4	10020069	1	0	2	1	2	0	0	2	1	2	0	1	0	post PTCA	0	0	0	86	180	110	4	1	1	1	0
47	50	1	13.11.2023	24.11.2023	0	0	1	10020174	1	0	0	0	0	0	0	0	0		1	0	0		0	0	0	98	150	80	12	1	0	0	0
48	84	0	19.11.2023	25.11.2023	1	7	1	10021299	1	0	0	1	0	0	0	0	0		0	0	0		0	1	1	80	160	100	15	1	0	0	0
49	57	0	05.12.2023	23.12.2023	0	19	3	10025064	1	0	0	2	0	0	0	0	1	3	0	0	0	0	0	0	0	80	140	100	11	1	1	1	0
50	69	0	07.12.2023	01.01.2024	2	26	4	10025349	1	0	2	2	0	0	0	1	0	0	0	0	0	epilepsy	0	0	0	70	150	100	8	1	1	1	1
51	42	0	22.12.2023	18.01.2024	0	26	1	10028867	2	0	1	1	0	0	1	0	1	1	0	0	0		0	0	1	90	210	120	13	1	0	1	0
52	47	1	03.01.2024	15.01.2024	3	12	3	10031372	0	0	2	3	2	0	3	0	1	1	0	0	0		0	0	0	100	150	90	5	1	1	1	0
53	58	1	6.1.24	2.2.24	0	27	2	10032016	1	0	1	0	2	1	0	0	1	4	0	0	0		0	0	0	78	190	100	12	1	0	1	0
54	47	1	04.01.2024	15.01.2024	3	12	3	10031372	0	0	2	3	2	0	1	0	1	0.83	0	0	0	0	0	0	0	100	150	90	5	1	1	1	0
55	51	0	11.1.24	3.2.24	0	24	2	10033151	2	0	0	1	0	0	0	0	1	new	0	0	0		0	0	1	78	170	110	14	1	1	1	0
56	71	1	13.1.24	9.2.24	3	26	4	10033505	2	0	1	1	0	0	0	0	1	1o	0	0	0	copd	0	0	0	88	140	90	12	1	1	1	1
57	65	0	20.1.24	25.1.24	0	5	0	10035073	2	0	0	0	0	1	1	0	1	new	1	0	1	0	0	0	0	82	130	90	14	1	0	0	0
58	62	1	31.1.24	7.2.24	3	7	4	10037298	0	2	2	0	0	1	0	2	1	new	1	0	0	seizure	0	1	1	108	160	100	7	1	1	1	1
59	34	0	21.1.24	23.1.24	0	3	0	10035092	2	0	0	0	0	0	0	2	1	4	0	0	0	0	1	1	1	88	150	90	15	1	0	0	0
60	68	0	1.2.24	6.2.24	2	6	3	10037565	2	0	1	2	1	1	0	0	1	15	0	0	0	0	0	0	1	130	110	70	9	1	1	1	0
61	75	0	4.2.24	21.2.24	3	17	5	10038294	2	3	0	3	0	1	0	0	1	25	1	0	0	0	0	0	0	94	200	120	4	1	1	1	1
62	70	0	9.2.24	10.2.24	2	2	3	10039640	1	0	1	1	0	0	0	1	1	2	0	0	0	0	0	0	1	86	160	90	7	1	1	1	0
63	40	0	10.2.24	26.2.24	0	17	0	10039851	1	0	0	0	1	0	0	0	1	new	0	0	0	0	0	0	1	80	240	90	15	1	0	0	0
64	41	0	22.2.24	26.2.24	0	5	0	10042599	2	0	0	1	0	0	0	0	1	0.6	0	0	0	0	0	0	0	88	160	100	15	1	0	0	0
65	55	0	26.2.24	2.3.24	0	6	0	10043264	1	0	0	1	0	0	0	0	1	new	new	0	0	0	0	1	1	84	150	90	14	1	0	0	0
66	58	0	26.2.24	29.2.24	0	4	0	10043362	2	0	0	1	0	0	0	0	1	4	1	0	0	ckd	0	0	0	86	140	90	15	1	0	0	0
67	70	0	1.3.24	14.3.24	0	14	1	10044127	1	0	1	1	1	0	1	0	1	new	0	0	0	0	0	0	0	80	160	100	12	1	0	0	0
68	39	0	8.3.24	8.3.24	3	1	4	10045690	0	0	2	0	0	0	0	0	1	2	0	0	0	0	0	0	1	76	170	100	2	1	1	1	0
69	73	1	9.3.24	19.3.24	0	11	0	10045841	2	0	0	0	0	1	0	0	1	8	0	0	0	0	0	0	0	64	180	100	13	1	0	0	0
70	75	0	22.3.24	26.3.24	0	5	0	10048997	2	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	1	60	180	100	15	1	0	0	0
71	85	0	4.4.24	28.4.24	3	25	3	10051698	1	0	1	1	0	0	0	0	1	30	1	1	0	0	0	0	0	86	150	90	12	1	1	0	0
72	42	0	6.4.24	6.4.24	2	1	5	10052189	3	0	2	3	2	0	1	2	1	4	0	0	0	0	0	0	0	40	nr	nr	3	1	1	1	1
73	62	0	13.4.24	16.4.24	3	4	5	10053505	2	0	1	0	2	0	0	0	1	new	1	0	0	0	0	0	0	58	240	120	4	1	1	1	1

SL NO	HB	WBC	PLATELET COUNT	NEUTROPHIL	LYNPHOCYTE	NLR	UREA	CREATININE	SODIUM	POTASSIUM	INR	HBA1C	TB	DB	IB	SGOT	SGPT	ALP	ALB	cholestrol	TG	HDL	LDL	prognosis				
						#DIV/0!																						
1	10	11100	191000	83	10	8.3	86	2.26	147	4.05														DEATH	20.05.2023			
2	13.7	9300	114000	75	16	4.6875	10	0.65	134	2.74	1.09		0.94	0.38	0.56	16	12	80	3.6					alive			9945549520	7033083
3	13.3	6900	246000	78	14	5.571428571	12	0.85	137	4.29	0.98	5.6	0.56	0.27	0.29	15	14	98	4.1					alive			9449948699	7040135
4	14.5	6100	150000	67	22	3.045454545	13	0.57	133	4.69	1.23	5.2	4.37	0.07	4.3	53	17	93	3.7		43	38	39	alive			8197816777	7057516
5	16.5	9900	216000	59	26	2.269230769	27	0.99	137	3.74	0.97	6.9	1.17	0.4	0.77	18	25	86	4.2					alive			7353088607	3470051
6	11.9	9800	179000	79	12	6.583333333	20	0.65	140	3.85														alive			9448907652	7079555
7	11.6	13300	250000	90	4	22.5	34	1.8	131	4.92	0.97			0.47	0.2	22	17	87	3.9					DEATH	19.06.2023		9632666628	7090664
8	11.8	19300	240000	88	8	11	20	0.9	136	4.1	0.95		0.33	0.21	0.12	12	11	106	3.4					DEATH	24.06.2023		9341100770	7096827
9	14.7	14600	210000	92	4	23	25	1.04	126	4.8	0.98		0.92	0.24	0.68	26	18	16	4.8					DEATH	25.06.2023		9481658687	7100100
10	16.1	18000	456000	80	12	6.666666667	71	0.87	134	4.76	1.02		0.85				49							DEATH	13.07.2024		8762532078	7117564
11	16.1	18000	456000	80	12	6.666666667	71	0.87	134	4.76	1.02		0.85				49							DEATH	13.07.2023		7022080663	7020566
12	11.9	7400	135000	64	29	2.206896552	21	1.01	138	4.79	0.99	7.3	0.55	0.23	0.32	20	15	102	4.3	100	160	32	36	alive			9591631007	7124346
13	17.1	23500	162000	92	3	30.66666667	31	0.95	135	3.25	0.93		1.08	0.37	0.71	37	38	109	4.4					DEATH	21.07.2023		9036858214	7129701
14	14.9	15400	298000	94	3	31.33333333	29	0.93	138	3.43	1.04		0.48	0.26	0.22	30	27	101	4.65					DEATH	23.07.2023			
15	11.4	16000	513000	84	11	7.636363636	21	0.56	137	4.1	0.9		1.93	0.57	1.36	26	17	130	4.5					lost to follow up				7131257
16	11.4	16000	513000	84	11	7.636363636	21	0.56	137	4.1	0.9		1.93	0.57	1.36	26	17	130	4.5					DEATH	21.07.2024		827738527	7131257
17	12.4	8300	349000	80	15	5.333333333	31	0.62	136	3.83	0.78		0.13	0.08	0.05	30	26	117	2.24					alive			9964350117	7132219
18	14.3	10400	365000	54	9	6	26	0.76	137	4.35	0.96	5.4	0.46	0.22	0.24	21	12	146	4.31	179	74	47	125	alive				7135353
19	11.8	12900	238000	91	3	30.33333333	27	1.03	133	3.79	0.92		1.65	0.82	0.83	26	17	59	4.08					DEATH	27.07.2024		6363386491	7138219
20	12.5	16500	89000	80	15	5.333333333	43	1.45	146	4.5	0.92	7.6	1.2	0.8	0.4	29	36	110	4.2	143	122	46	135	DEATH	28.07.2024			7111905
21	14.1	7600	233000	76	14	5.428571429	40	1.02	136	4.24	1.11	7.6	0.45	0.28	0.17	35	19	88	4	148	88	30	106	alive			7353857674	7145470
22	12.3	17200	230000	88	6	14.66666667	24	0.99	135	4.14	1.03		0.4	0.23	0.17	47	36	78	4.17					alive			8453265556	7150444
23	16.1	11200	291000	73	17	4.294117647	12	0.82	134	4.19	1.26		0.59	0.2	0.39	48	50	117	3.57					alive			8131002427	7156931
24	17.7	14900	330000	89	8	11.125	38	0.74	136	5.74	1.03		1.79	0.71	1.76	19	20	210	3.6					DEATH	12.08.2023		8151928663	7164134
25	0	7700	193000	90	6	15	45	2.06	134	3.48	0.98	5.5	1.67	0.9	0.77	45	34	98	4.2	188	108	50	127	alive			9342266669	7166944
26	11.1	6200	355000	61	32	1.90625	9	0.45	139	3.83						30	18							alive			9945650199	7168220
27	14.4	21400	324000	81	14	5.785714286	35	0.97	138	3.81	1.19	7.2												DEATH	26.08.2023		9379197722	7168251
28	12.3	13400	252000	57	28	2.035714286	32.9	1.26	137	4.58	0.86	8.5								136	104	44	80	alive			7353506705	7183989
29	14.4	8300	218000	51	36	1.416666667	14.3	0.76	140	3.55	0.93		0.37	0.17	0.2	84	94	65	4.3	185	466	35	138	alive			9986270806	7184972
30	10.6	7200	279000	78	14	5.571428571	19.2	1.48	134	4.43	1.15	5.9	0.35	0.16	0.19	24	23	88	4.4	156	101	29	109	alive			9739774280	7188412
31	14.6	12400	128000	83	10	8.3	16.1	0.87	138	3.84	1.1		1.74	0.3	1.44	46	15	86	4.5	85	380	30	52	DEATH	16.09.2023		9380998421	7195437
32	11.8	8800	160000	82	12	6.833333333	26.8	0.54	137	3.25	0.89		2.11	0.76	1.35	24	14	118	4	181	75	48	104	alive			9875967894	7198880
33	10.1	13500	228000	86	10	8.6	25.7	0.84	132	4.82	0.97		0.37	0.18	0.19	33	29	111	3.6					DEATH	15.10.2023		8369318067	7214353
34	14.7	8400	380000	80	9	8.888888889	39	0.69	136	3.7	1.09		0.62	0.33	0.29	27	42	60	3.7					alive			9008127464	7215869
35	12.6	17900	284000	89	5	17.8	30.7	1.14	134	4.44	1.2		1.63	0.79	0.84	36	15	60	4.5	162	76	69	78	alive			8105896879	7216011
36	11.6	6100	116000	92	6	15.33333333	42.5	1.29	136	4.08	1.01	5	0.8	0.31	0.49	29	17	55	3.6	143	77	45	74	alive				
37	15.6	12700	196000	86	6	14.33333333	29.2	1.44	139	4.36	1.09		0.93	0.41	0.52	27	30	59	4.4					DEATH	15.10.2023		8861463810	7223177
38	13.8	12800	225000	87	8	10.875	25.4	1.5	136	3.17	0.98	4.6	1.41	0.6	0.81	27	32	73	4.6	148	113	45	84	alive			9980675701	7229886
39	16.8	12500	273000	73	18	4.055555556	23.1	0.97	140	3.14	0.98	6	1.37	0.65	0.72	21	12	97	3.5	185	73	44	124	alive				
40	11.6	11800	291000	92	5	18.4	10	0.46	135	3.67	0.9		0.42	0.17	0.25	20	11	88	4.6					alive				
41	9.8	8800	258000	84	10	8.4	29.1	0.76	139	4.49	0.92		0.19	0.11	0.08	24	14	69	4.1	191	100	46	133	alive			9480445054	7231977
42	15	16900	329000	90	7	12.85714286	19.2	0.7	136	3.73	1.2	7.4				28	32			263	147	38	199	alive			9844857954	7236486
43	13.9	17700	185000	87	6	14.5	21.1	0.83	137	3.74	1.05		0.94	0.62	0.31	22	28	79	3.8	110	70	37	59	alive				
44	14.5	6400	216000	73	14	5.214285714	74.1	5.86	136	4.6	0.9		0.25	0.14	0.11	24	30	78	3.6	168	155	39	92	alive				
45	12.4	13200	359000	91	5	18.2	37.3	0.76	143	3.75	0.91	6.4	0.68	0.28	0.4	26	19	102	5.1	181	63	59	103	alive			7022019468	7241895
46	14	20100	309000	93	5	18.6	25.8	0.94	139	3.56	0.88		0.65	0.32	0.33	32	6	154	4.6					DEATH	14.11.2023		9900702931	51341897
47	14.2	13800	301000	81	16	5.0625	16.6	0.45	131	4.26	0.91	12.8								123	118	29	78	alive			8197034906	7251066
48	15.6	9900	290000	80	14	5.714285714	21.1	1.06	127	4.92	1.02		0.73	0.37	0.36	20	15	69	4	197	139	44	139	alive			7760923087	6932906
49	14.4	11200	274000	85	8	10.625	26.5	1	137	3.44	0.98									182	72	63	107	alive			8762641987	7274593
50	13.3	16800	309000	91	9	10.11111111	25.7	1.2	133	3.3	1.03		1.2	0.49	0.71	25	17	82	4.1	141	57	94	94	alive				
51	15	12400	150000	86	8	10.75	93	0.68	135	3.82	1.08		3.34	2.22	1.12	214	102	100	4.4					alive		decompression	9742939777	7292319
52	12.8	18900	448000	89	8	11.125	19.4	0.69	133	4.15	1		0.29	0.11	0.18	22	13	104	3.1					DEATH	15.01.2024			
53	12.2	129000	274000	87	1o	#VALUE!	26.4	1.12	140	3.69	0.89		0.27	0.12	0.15	20	10	127	4.4					alive			7618701863	7306266
54	12.8	19600	448000	89	8	11.125	19.4	0.69	133	4.15	1		0.29	0.11	0.18	22	13	104	3.1	287	98	52	224	DEATH	15.01.2024	evd	9980073770	7302886
55	11.5	15700	341000	92	3	30.66666667	37.5	1.03	139	3.52	1.1		1.23	0.61	0.61	79	23	120	3	203	86	128	71	alive		decompression	7026934008	7310419
56	10.2	8800	269000	84	12	7	19.7	0.66	138	3.82	1.12		0.28	0.16	0.12	26	19			221	48	76	134	DEATH	09.02.2024		9916995555	7312129
57	13.6	5800	310000	66	24	2.75	28.2	0.78	125	3.94	1.02	12.1	0.52	0.24	0.28	24	17	137	4.2					alive			9448340716	7302270
58	15.5	17700	268000	91	4	22.75	39	1.07	137	4.35	1.12	8.1	0.77	0.49	0.28	52	46	110	4.6	195	70	68	113	DEATH	07.02.2024		9901197384	7328741
59	15.2	12400	228000	94	5	18.8	23.1	1.51	134	4.76						33	26	104						alive			8431649128	7319755
60	12.3	16000	302000	86	5	17.2	94.5	2.07	138	3.64	1.31		1.85	0.63	1.22	43	19	84	4.1					DEATH	10.02.2024		9731871725	7330141
61	15.7	18400	221000	91	3	30.33333333	40.7	1.23	141	4.61	1.09		0.79	0.42	0.37	30	25	75	5					death	21.02.2024		9480311630	7334000
62	13.2	17700	374000	91	4	22.75	32.7	1	118	3.8	1.05													death	11.02.2024		9113871237	7340371
63	15.6	9000	276000	54	33	1.636363636	14.9	0.94	141	3.35	0.98		0.57	0.27	0.3	43	56	138	4.9					alive			9480423430	7341762
64	14.9	7900	211000	75	17	4.411764706	16.5	1.03	137	2.95	1.16		1.07	0.41	0.66	20	22	92	4.3					alive			9008491767	7359328
65	15.3	7300	179000	68	25	2.72	11.1	0.69	134	3.44	1	9.2	1.35	0.64	0.71	22	13	102	3.1					alive			9008491757	7359328
66	13.3	9600	258000	72	16	4.5	66.6	4.62	141	4.86	0.99													alive			8904416979	7364108
67	12.7	10400	244000	80	12	6.666666667	26.1	0.8	138	3.44	1.17		0.9	0.36	0.54	27	15	94	4.4					alive			8095191957	7369687
68	16.4	10500	173000	62	28	2.214285714	22.5	1.3	138	4.01	1.27		2.43	0.92	1.51	74	34	88	4.6	182	210	36	124	DEATH	08.3.2024		9036757188	7378726
69	1.16	14500	382000	73	17	4.294117647	22.1	0.87	138	5.31	0.88		0.39	0.26	0.13	20	10	117	4.5					alive			9008375043	7378937
70	12.9	5800	189000	59	30	1.966666667	29.2	1.06	136	3.98	1.08		2.3	0.78	1.52	23	21	58	4.4	173	258	32	111	alive			9591208808	7395251
71	17.8	11500	187000	75	18	4.166666667	128	3.66	130	4.41	1.28		1.93	0.8	1.13	34	42	108	4.7	74	160	38	22	DEATH	28.04.2024		966329955	3140126
72	18.6	19700	314000	93	5	18.6	16.4	1.2	141	3.97	1.01		1.16	0.87	0.29	446	106							DEATH	06.04.2024		991699106	7412029
73	13.5	19000	239000	84	5	16.8	23.6	0.75	140	3.9	1.08	6.1	0.63	0.37	0.26	31	21	88	4.8					DEATH	16.04.2024		9742718021	7420276

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