

# Frequency of Hydrocephalus in Patients with Spontaneous Intracerebral Hemorrhage (ICH) at Chandka Medical College Hospital Larkana

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## ABSTRACT

**Background:** The small rupture of vessels damaged due to HTN (Hypertension) or amyloid angiopathy is the causative agent of ICH (Intracerebral Hemorrhage). There is strong association of Spontaneous ICH with high rate of morbidity as well as in hospital mortality. Other important factors include altered conscious level, hematoma volume, midline shift, intraventricular extension, high blood pressure and renal dysfunction.

**Objective:** The rationale of this research study was to find out the rate of occurrence of hydrocephalus among patients who suffered from spontaneous ICH and to observe the in-hospital outcome for these patients having hydrocephalus.

**Methodology:** The design of this study was descriptive, cross-sectional study. Patients of spontaneous ICH admitted to the Neurology Department CMC Hospital, Larkana were the samples of this study and the duration of this study was from June 2021 to November 2021. Total 87 patients were the participants of this research study. Hypertension was confirmed through clinical record or two readings ten minutes apart. Diabetes was diagnosed through clinical record or through HbA1C. CT scan brain was done. The diagnosis of spontaneous ICH was carried out on the basis of the clinical and radiological criteria and admitted for further diagnosis of hydrocephalus and in-hospital outcome. We calculate the descriptive statistics. We performed the stratification with the utilization of Chi square test considering the P-value of  $\leq 0.050$  as much significant.

**Results:** Total 59.80% male and 40.20% female patients were the subjects of this research work. Mean age and BMI was  $35.63 \pm 10.13$  years and  $26.69 \pm 7.92$  kg/m<sup>2</sup> respectively. The frequency of hydrocephalus with spontaneous intra-cerebral hemorrhage (ICH) was found in 58.60% patients and their in-hospital mortality was recorded in 49.40% cases.

**Conclusion:** A significant number (58.60%) of patients of ICH were having hydrocephalus and it has a strong association with the high rate of mortality 49.40%.

**Keywords:** Hydrocephalus, Spontaneous ICH, In-Hospital Outcome

## INTRODUCTION

There is high prevalence of stroke in world which is also a leading causative agent for high mortality rate. It can lead to neurologic disability among adults. This condition can be explained as fast established clinical signs of cerebral function's focal disturbance, which can last for more than one day or causing death without any reason of vascular origin [1]. Mainly, it includes two important disorders which are hemorrhagic strokes and ischemic stroke. Discussing about the first, Spontaneous ICH causes hemorrhage in parenchyma of brain with no surgery or trauma, which may be classified as primary and/ or secondary on the basis of etiology [2]. ICH is the outcome of rupture of the small vessels injured by HTN (Hypertension) or amyloid angiopathy. This accounts for about 10% to 20% of all kinds of strokes. The rate of prevalence of ICH in developing and underdeveloped countries is two times higher than the incidence in developed countries [3]. ICH is responsible for approximately 30% to 40% of all strokes in our country Pakistan. There is strong association between spontaneous ICH with high incidence of morbidity and in-hospital mortality [4].

This complication is responsible for 10% to 15% of all types of strokes with very high rate of mortality as compared to other types of strokes. In whole world, various research studies has nominated some radiological and clinical factors which support in the prediction of mortality among patients suffering from spontaneous ICH and in the identification of the patients with high risk. Some other vital factors include changes level of consciousness, hematoma's volume, high BP, midline shift, dysfunction of kidneys and intra-ventricular extension. In different research works, the range of the thirty-day mortality due to ICH is from 35.0% to 52.0%, with 50.0% mortalities occurring in first 48 hours [5].

One important parameter of radiology, which was stated as important in the prediction of mortality was the availability of hydrocephalus on computed tomography of brain. It was seen in 72.22% (n=39/54) of the patients with ICH who had hydrocephalus. The overall frequency of hydrocephalus in these

patients was 34.18% (n=54/158) among those who expired were 50% (n=39/78) of dead patients 18.8% (n=15/80) who survived [6].

In a study conducted at PIMS Islamabad, Ahmed F et al noted that 53.12% (n: 51) patients of ICH were having hydrocephalus. Out of these fifty one patients of ICH having hydrocephalus, 64.70% (n: 33) patients survived whereas 35.30% (n: 18) patients met their final destiny. In one retrograde research work, Chang C-Y stated the positivity of hydrocephalus in 69.40% (n: 50 out of 72) patient present with ICH. Among these patients, mortality during the study period was noted among 36% of patients. Spontaneous ICH is a grave medical emergency with poor outcome, no specific medical treatment and controversial role of surgical interventions. The mortality is increased by the presence of hydrocephalus. Rare local studies have been done on this subject [7]. Purpose of this study is to determine the burden of hydrocephalus in patients of spontaneous ICH and associated in-hospital mortality in these patients of to generate local data for allocation of resources; and to identify patients at high risk for mortality as the abnormality of hydrocephalus is acquiescent to surgical intervention so these patients are referred to departments of neuro-surgery for this intervention [8], which is resulting in reduction of mortality rate and improved outcome with very high rate of survival.

## METHODOLOGY

This research work was carried out on the patients with spontaneous ICH who got admission in Neurology Department of Chandka Medical College, Larkana. This was a cross-sectional descriptive research work. This research study covered a duration of complete six months from June 2021 to November 2021. We calculated the sample size with the utilization of the WHO calculator for sample size using undermentioned parameters.

- CL (Confidence Level) (1- $\alpha$ ) = 95.0%
- APP (Anticipated Population Proportion) (P) = 34.180%
- Requirement for absolute precision (d) = 10.0
- Recruited sample size = n: 87 patients with ICH

**Sample Selection:**

**Inclusion Criteria:**

- ICH patients from both genders
- Patients having more than 17 years of age and up to 65 years of age
- Patients with diagnosis of spontaneous ICH (as mentioned in operational definitions).

**Exclusion Criteria:**

- Patients present with epidural and subdural hematoma on computed tomography of brain.
- Patients suffering from traumatic-ICH.
- Patients with anti-coagulant associated hemorrhage.
- Patients diagnosed with sub-arachnoid hemorrhage on computed tomography of brain.

Permission was taken from the hospital Ethical Committee. Patients were enrolled through from the indoor/outdoor Neurology department of CMC, Larkana. After informed written consent, all patients were undergone detailed clinical history and physical examination. Hypertension was confirmed through clinical record or two readings ten minutes apart revealing a blood pressure >140/90 mmHg. Diabetes was diagnosed through clinical record or in case of record not available it was confirmed through HbA1C analysis showing >6%. A plain CT brain of all the suspected patients was done. Spontaneous ICH was diagnosed on the basis of the clinical and radiological criteria as defined in operational definition. Patients who confirmed the diagnosis of ICH were admitted for further diagnosis of hydrocephalus and in-hospital outcome in these patients as per defined in operational definition. Demographic features including age, gender, physical status, socioeconomic status and residential status as well as study results were recorded on a standard well organized Performa. We used the SPSS V.21 for data analysis. The calculation of averages and SD (Standard Deviation) was carried out for quantitative variables as BMI and age. We measured the qualitative variables (gender, residential status, socioeconomic status, hypertension, diabetes, hydrocephalus and in-hospital mortality) in percentages and frequencies. Effect modifiers like BMI, gender, age, residential status, socioeconomic status, hypertension and diabetes were controlled by the stratification for hydrocephalus and in-hospital mortality. We applied the chi square test and considered the P value of ≤0.050 as statistical significant.

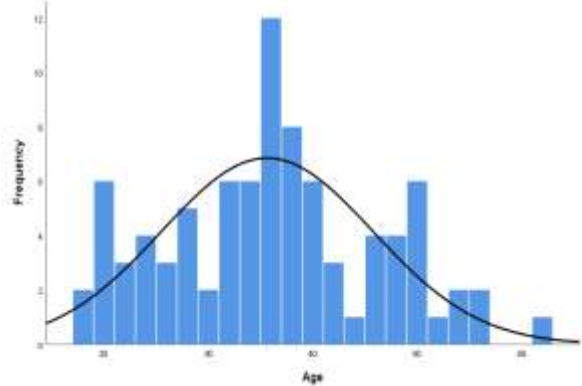
**RESULTS**

In this current research work, we assessed total eighty seven patients from both genders having a range of age from eighteen to sixty seven years, fulfilling the criteria for inclusion for the determination of the rate of occurrence of hydrocephalus among patients present with spontaneous ICH. We used the SPSS V.21 for the calculation of descriptive statistics. Quantitative variables were presented by mean ±SD. We presented the categorical variables in percentages and frequencies. Effect modifiers as gender, age, BMI, residential status, socioeconomic status, hypertension and diabetes were controlled by the stratification for hydrocephalus and in-hospital mortality. We applied the Chi square test to investigate the impact of modifiers on final outcome. We considered the P-value ≤ 0.050 as much significant. Total 59.80% patients were males and 40.20% patients were females as elaborated in Table-1. Average or mean BMI, weight, height and age were 26.69±7.92 kg/m<sup>2</sup>, 51.99±8.37 kg, 1.43±0.20 m and -35.63±10.13 years respectively. Statistics of detailed description of BMI, weight, height, age and surgery duration are available in Table-2 to 5. Graph-1 is displaying the age distribution. The age and body mass index further stratified in two groups. Frequencies of patients in age group and BMI group are presented in Graph-2 to Graph-3.

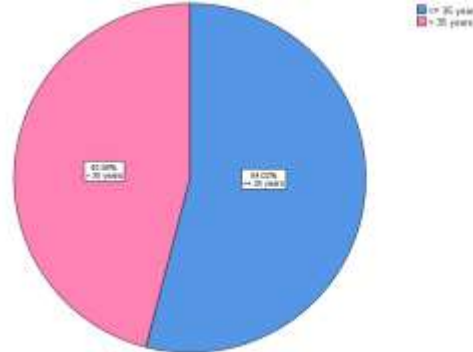
Their residential status was contributed as 40.2% belongs to rural areas and 59.8% belongs to urban areas. Most of the patients

(56.3%) had lower socioeconomic status. We observed that 78.2% were hypertensive and 58.6% were diabetic.

Graph-1: Patient's Percentage with respect to their age (n: 87)



Graph-2: Patient's Percentage according to age group (n: 87)



Graph-3: Patient's Percentage according to BMI Group (n: 87)

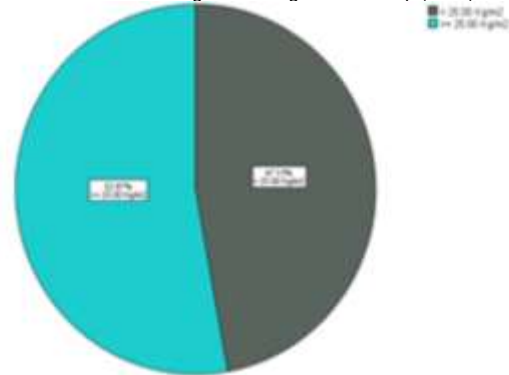


Table-1: Frequency of gender distribution (n: 87)

	Frequency (%)
Male	52 (59.8)
Female	35 (40.2)
TOTAL	87

Table-2: Descriptive statistics of age in years (n: 87)

Mean	35.63
SD	10.13
Median	35
Range	43
Minimum	18
Maximum	61

Table-3: Descriptive statistics of height in meters (n: 87)

Mean	1.43
SD	0.20
Median	1.47
Range	0.8
Minimum	1.0
Maximum	1.8

Table-4: Descriptive statistics of with in Kilograms (n: 87)

Mean	51.99
SD	8.37
Median	50.90
Range	32.8
Minimum	37.7
Maximum	70.5

Table-5: Descriptive statistics of BMI in kg/m<sup>2</sup> (n: 87)

Mean	26.69
SD	7.92
Median	25.30
Range	30.1
Minimum	16.7
Maximum	46.8

## DISCUSSION

ICH is an emergency of catastrophic nature in medical field. There is presence of vast research works to save the patients having ischemic stroke and to decrease the high rate of morbidity in consequence of ischemic stroke. For the improvement in outcome, there is need of more research and focus on ICH [9, 10]. There are many research studies which identified the radiological as well as clinical parameters which are associated with the adverse outcome of ICH. There was authentic observation that hydrocephalus on computed tomography of brain has association with the high rate of mortality in hospitals [11]. This research work stated the average age of the patients as 45.10±15.641 years. Among total ninety six patients, male patients were 54.17% and female patients were 45.83%. The average age of the patients in this research work was much lower as compared to the other research studies conducted in west regions where there is occurrence of stroke on the patients having more than fifty five years of age.

Total 72.0% patients were present with HTN (Hypertension) and most of the patients were having poor follow up and compliance [12, 13]. This finding may have association with the lifestyle and genetic factors but other research studies are required for consolidation. In research works conducted in Asia, majority of the patients are from male gender which is in contrast from the studies conducted in west regions with female dominance. There was presence of hydrocephalus in 53.12% patients with of ICH. In his research work, Diring MN assessed the patients having spontaneous-ICH and got admission in ICUs. He compared the patients present with hydrocephalus and without hydrocephalus. He performed the univariate as well as multivariate analyses for the determination of hydrocephalus as an independent prognosticator of occurrence of mortality. Of total 81 studied patients, forty patients were present with hydrocephalus. There was very high rate of in-hospital mortality among the patients having hydrocephalus (51.0% vs 2.0%). Among total fifty one patients of ICH present with hydrocephalus, 64.70% (n: 33) patients were survived whereas 35.30% (n: 18) patients met their death [14].

In his research study, Bhatia R stated that there was association between mortality and IVH (Intra-ventricular Hemorrhage), hydrocephalus, GCS (Glasgow Coma Scale), High volume of hematoma, ventilator assistance and midline shift [15]. There was presence of hydrocephalus in 68.60% patients who died in their stay at hospital. In one research study conducted by Cheung RT examined the patients who got admission in the hospital because of acute ICH and concluded that one of the main reason for the high rate of mortality was hydrocephalus [16]. Bhattathiri PS stated that there was very low probability of the

favorable results to 11.50% with the presence of IVH with hydrocephalus [17]. In one other research study, there was presence of hydrocephalus in forty patients out of total 100 patients. There was presence of hydrocephalus in 76.0% patients who died in hospital [18]. There are many other research studies in this particular literature predicting the outcome among the patients present with ICH [19, 20].

## CONCLUSION

Our study results showed that there was presence of hydrocephalus in 58.60% patients with spontaneous ICH. In-hospital mortality was recorded in 49.40% cases. This research study concluded that there was presence of hydrocephalus in majority of patients with ICH and it has a strong association with the high rate of mortality. So, ICH with the presence of hydrocephalus can be considered as a source of adverse outcome. There is requirement of further research studies on large sample sizes for the consolidation of the findings of this research work.

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