THE CLINICAL PROFILE AND THE OUTCOME OF CEREBRAL VENOUS SINUS THROMBOSIS IN A TERTIARY CARE FACILITY

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ABSTRACT –

Background:

Stroke caused by thrombosis of the cerebral venous sinuses, also known as CVST, is a rare type of the condition that often affects younger people. The clinical manifestations of CVST are quite varied; hence, a high degree of clinical suspicion is required in order to correctly diagnose the disorders.

Materials and Methods:

This 18-month prospective observational study was conducted in the Medicine wards of Krishna Institute of Medical Sciences and Research Hospital, Karad. The study examined 64 cerebral venous sinus thrombosis patients' variables.

Results:

The mean age of research participants was 37.70 (±13.39) years, and 62.5% were 18-40 years old. 40 of 64 patients were 18–40. It's more frequent in middle age. Of 64 patients, 66% were male and 34% were female (1.91:1). 42 men and 22 women participated. Most hospitalised patients stayed fewer than 10 days. 50 of 64 patients stayed fewer than 10 days. Only one patient stayed over 20 days. Though not statistically significant, patient outcomes were better with a stay of less than 10 days. Haemoglobin, hematocrit, and total leukocyte counts were statistically significant for brain venous sinus thrombus distribution. Liver function test, lipid profile, creatinine, and PT/INR had no statistical significance. CVST symptoms vary. In this research, headache, vomiting, thirst, extensor plantar, seizures, fever, motor involvement, papilledema, and altered sensorium were the most prevalent manifestations. This study compares CVST patients. Headache is still the predominant symptom. Fever and papilledema are lower than in earlier investigations.

Conclusions:
The most prevalent symptom of CVST in the research population was headache and vomiting. The most prevalent CVST condition was superior sagittal sinus thrombosis. Peripartum impacted 30% of women. Infection and dehydration were the most prevalent causes of CVST, and more than 20% had hyperhomocysteinemia. Sigmoid, transverse, and/or multiple sinus involvement in males and superior sagittal sinus thrombosis in females increased mortality. CVST has lower morbidity and mortality than arterial stroke and requires intensive treatment.

INTRODUCTION -

The most common cause of stroke in younger people is a condition known as cerebral venous sinus thrombosis. CVST is a potentially harmful condition that often strikes people in their 20s to 40s. In India, 10–20 percent of all juvenile strokes are caused by cerebral venous thrombosis. After giving birth, it affects two-thirds of women. Infection as a potential cause of CVST has drastically reduced during the past many years. Primary or idiopathic CVST can be caused by hypercoagulability brought on by puerperium or by dehydration. Puerperal CVST was seen in 15%–20% of younger victims of stroke. (Appenzeller et al., 2005, Mehndiratta et al., 2006, Saposnik et al., 2011).

Induction of CVST can occur as a result of protein C resistance brought on by the factor V Leiden polymorphism, resistance to protein C and protein S, or a lack of antithrombin III. SLE and PAN are two examples of other forms of vasculitis that can affect young persons. The most common cause of puerperal CVST in our society is dehydration. The purpose of this study was to investigate the CVT aspects of rural hospitals. Young individuals are impacted by CVST. Between 0.5 and 1 percent of all strokes are CVST. Some CVST factors are reversible (Pai et al., 2013, Surendrababu et al., 2006)

Two of the criteria that describe cerebral venous sinus thrombosis, often known as CVST, are clinical pleomorphism and pathogenic variability. Even though it is relatively uncommon in comparison to arterial diseases and most commonly affects younger people, it is an essential factor to take into consideration due to the potential morbidity it presents. Even though these facts are true, it does not change the fact that it is important. In order to accurately identify cerebral venous sinus thrombosis (CVST), a large level of clinical suspicion is necessary. This is due to the fact that the clinical symptoms of CVST can vary greatly from patient to patient. Because of the diverse ways in which it might present itself, cerebral venous sinus thrombosis is commonly misdiagnosed in clinical settings. As a result, the condition cannot be recognised until a radiologist finds evidence of it (Saposnik et al., 2011).

In spite of the fact that it has been recognised for well over a century (19th century), it was not until fairly recently that it became feasible to discover it before it resulted in death. This is attributable, in part, to the development of superior non-invasive imaging tools, most notably magnetic resonance venograms, as well as, in part, to an increase in knowledge among medical professionals such as neurologists and physicians. According to

Surendrababu et al. (2006), this causes the clinical manifestations of the disease to be confused with those of a variety of other clinical conditions.

The chance of getting cerebral venous sinus thrombosis increases with age, but it can affect people of any age. On the other hand, the majority of people who were afflicted were women of reproductive age, and the symptoms that they experienced were mostly related to puerperium. According to the length of time that symptoms persist, their onset can be categorised as either acute, sub-acute, or chronic. A disease that is known as cerebral venous infarction is the most serious complication that can occur as a result of cerebral venous sinus thrombosis. This disorder often manifests itself in several locations and on both sides of the body. It can cause damage to the subcortical white matter as well as the grey matter of the brain (Nagaraja et al., 2007, Kumar et al., 2010).

Patients who have CVST frequently display symptoms like headache, vomiting, altered sensorium, seizure, and localised abnormalities in their bodies. According to Saposnik et al. (2011), the thrombosis of intracranial veins and sinuses is the root cause of these symptoms. This condition can also result in hemorrhagic infarctions and an increase in benign intracranial tension.

In India, CVST is a distinct subgroup within cerebrovascular illness and is recognised as one of the leading causes of death among women of reproductive age. In addition to this, CVST is a factor that can lead to a stroke. The postpartum period is the most prevalent time for the condition to emerge in India, whereas excessive drinking is one of the most important risk factors for males. The most common time for the disease to appear is after a woman has given birth. According to a research that was published by Pangariya A et al., in India, cerebral venous sinus thrombosis is the cause of around 40% of strokes that occur in women and 50% of strokes that occur in young people. Women make up around seventy-five percent of all adult patients who have been identified as having cerebral venous sinus thrombosis. This discrepancy is most likely linked to the usage of oral contraceptive pills, pregnancy, and puerperium (Nagaraja et al., 2007, Ahmad et al., 2017). [Citation needed]

Review of CVST cases from Asian countries has shown that there may be differences in the risk factor profile as well as the result in these patients when compared to research carried out in Europe. This was discovered after comparing the results of the research to the cases reviewed. A cohort of CVST patients from Europe consisting of a total of 624 persons discovered that the usage of oral contraceptive pills was responsible for fifty percent of the cases, pregnancy was responsible for six percent of the cases, and fourteen percent of the cases occurred during the puerperal stage. The results of a study in which 182 adult patients in the United States were diagnosed with CVST revealed that 7% of instances are linked to pregnancy and puerperium, and that 5% of cases are connected with the use of oral contraceptive pills. The study was conducted in the United States. In a study that was carried out in Pakistan with 109 individuals who had been diagnosed with CVST, it was discovered that pregnancy and puerperium were responsible for 17% of the instances, whereas oral contraceptive pill use was linked to 5% of the cases. Cantu, who was doing his research in Mexico at the time, came to the conclusion that pregnancy and puerperium were responsible for 59% of the instances. (Nagarajan et al., 2013, Pfefferkorn et al., 2009)

According to research done by Cross et al., a patient will generally have a speedy and full recovery if they are able to make it through the acute episode alive. Three quarters of the cases of CVST that were reported to him by women of reproductive age were effectively treated, and the patients recovered well from their illnesses. On the other hand, previous to the era in which brain imaging was established, CVST was only ever found during the process of an autopsy, and as a result, it was believed that the condition invariably resulted in death. The mortality rate has decreased by a sizeable amount as a direct result of the implementation of heparin as an anticoagulant within the context of the treatment of CVST. In contrast to earlier studies, which discovered a mortality rate ranging from 30 to 50 percent, more recent ones discovered a mortality rate of less than 20 percent. However, the result of CVST is highly unpredictable, and it is not unusual to observe a dramatic recovery in a patient who is deeply comatose, while at the same time it is not unusual to see a sudden worsening in the condition of conscious patients due to the extension of the thrombosis (Pfefferkorn et al., 2009, Appenzeller et al., 2005).

Since the development of imaging methods such as computed tomography scans and, more recently, magnetic resonance imaging (MRI) and magnetic resonance venography (MRV), the diagnosis of CVST has made significant strides forward. A computed tomography (CT) scan will commonly reveal hemorrhagic infarctions, either with or without the "cord" or "empty delta" signal. This can happen either with or without the presence of the sign. When utilised in situations that are unclear, magnetic resonance imaging and venogram might eliminate any uncertainty about the diagnosis by displaying thrombosis in the sinus of the cortical veins. (Ahmad et al., 2017, Appenzeller et al., 2005).

In point of fact, with the advent of magnetic resonance venogram, it was discovered that many of the patients who had previously been diagnosed with idiopathic high ICT really had cerebral venous sinus thrombosis, which was the cause of the syndrome of increased intracranial pressure without any specific location. This was the root cause of the syndrome of increased intracranial pressure without any specific location. On a pathological level, a common finding that was documented was involvement of the superior sagittal sinus to varying degrees, with or without involvement of the transverse and sigmoid sinuses, and thrombosis of the cortical veins. Additionally, involvement of the superior sagittal sinus was also observed. It is common to see infarcts of the brain that have a hemorrhagic component and a mass effect, as well as extensive cerebral edoema with herniation. Participation in the deep venous system, while not as common as engagement in the superficial venous sinus system, is by no means unheard of. Participation in the superficial venous sinus system is far more common. (Pai et al., 2013, Borhani Haghighi et al., 2012, Mehndiratta et al., 2006).

It will be fascinating to find out whether distinct pathophysiological processes are at action in diverse clinical scenarios (Appenzeller et al., 2005). Because cerebral venous sinus thrombosis may be induced by a variety of different circumstances, it will be interesting to find out whether these mechanisms are at work.

Studying the demographic profile of patients, correlating the clinical presentation, risk factors, and radiological findings of cerebral venous sinus thrombosis, and determining the relationship between the findings of magnetic resonance venograms and the outcome of

cerebral venous sinus thrombosis were the objectives of the current investigation, which was carried out with the goals of determining the relationship between the findings of magnetic resonance venograms and the outcome of cerebral venous sinus thrombosis.

MATERIALS AND METHODOLGY –

This study was carried out over the course of 18 months, beginning on the first of December 2017 and ending on the 31st of May 2019. This was a prospective research that just involved observation and did not include any kind of active intervention. The Department of Medicine at a teaching hospital that specialised in tertiary care was the one responsible for carrying out this research. The ethics committee at Krishna Hospital and Medical Research Centre, which is located in Karad, gave its blessing to the study. A total of 64 patients who were currently receiving treatment in a variety of hospital wards as well as the Intensive Care Unit were recruited in order to participate in the research for the aim of the current study.The CVST was seen on magnetic resonance imaging (MRI) in each and every one of the individuals who took part in this particular investigation. Every patient who was eligible for the CVST had their information entered on a data input sheet, which was then submitted to the testing centre. These patients might be either gender, but they had to be at least 15 years old to participate in the study. Treatment was administered to each individual patient in the critical care unit in accordance with the rules and protocols that had previously been established. Patients who were identified as having CVST were given medical attention in the intensive care unit of the hospital. Patients who were found to have CVST were treated with a variety of medications and procedures, such as intravenous fluids to treat dehydration, decongestive agents, anticonvulsant medicines, antibiotics, low–molecular weight heparin (LMWH) (if it was not contraindicated), decompressive craniotomy, supplementations of methylcobalamin and folic acid, and so on.

Both the Institutional Protocol and the ethics committee gave their permission to this study. Before patients were allowed to participate in the trial, we obtained both their verbal and written consent.

Each patient who was included in the study was given a comprehensive clinical assessment as well as in-depth investigations.

Participants in the research gave their verbal and written consent, as well as their informed consent. The recording of personal information was done using a pre-structured pro-forma.

A comprehensive clinical history was obtained, with particular attention paid to the patient's symptoms, as well as their family history of diabetes mellitus, hypertension, and dyslipidemia; use of oral contraceptive pills; pregnancy; any haematological illness; cancer; and intake of alcohol.

There was a comprehensive review of the patient's physical condition. When the patient was lying supine, the blood pressure was measured with a mercury sphygmomanometer that had been carefully calibrated (a Diamond BP MR-120 Mercurial BP Deluxe). At a minimum of two different points in time, readings were collected with an interval of one minute in between each one, and the average of all of the measurements was recorded.

Other measures, such as the pace of the patient's pulse, were monitored in the radial artery for the full minute. When the patient was in the supine position for the full minute, their

respiratory rate was measured. At the time of admission, an axillary temperature reading was recorded. During the time that the patient was hospitalised, these vital signs were examined on a daily basis.

Those who were able to pay for the tests, such as the coagulation profile and homocysteine levels, were the ones who received them.

The patient was followed following their hospital stay, which included any follow-up visits or, in the event of death, the hospital stay itself. Complete data were collected throughout their time in the hospital.

INVESTIGATIONS - All patients underwent basic investigations, such as hemogram, electrolytes, blood sugar levels, renal function tests, and chest radiographs. Liver function tests, coagulation studies, inflammatory markers, and homocysteine levels were done in selected patients because of financial constraints.

RESULTS –

A total of 64 individuals were enrolled in this study, each of whom was at least 15 years old and none of them were less than 15. By using magnetic resonance imaging combined with venography, all of the patients were shown to have instances of cerebral venous sinus thrombosis.

The Krishna Institute of Medical Sciences in Karad was the location of the present investigation, which was prospective observational research. All of the patients were admitted into the hospital under the care of the department of medicine throughout the course of a span of 18 months, from November 2017 until August 2019.

Frequency distribution of age:

The current study was a prospective observational one, and it included a total of 64 patients; of those patients, 40 (or 62.5% of the total) were in the age range of 18 to 40 years. Male patients made up 65.6% of the total patient population. The third and fourth decades of life were the most typical times when it occurred. With a maximum age of 80 years, only three out of sixty-four patients (4.7%) were older than sixty years of age. Patients had a mean age of 37.7 years, and the standard deviation was 13.39 years.For males, the mean age was 38.7 years, with the standard deviation being 14. For females, the mean age was 35.9 years, with the standard deviation being 11.8.

Distribution of gender:

The participants in this current prospective observational study totaled 64, with 42 male patients accounting for 65.6% of the total and 34.4% of the total being female patients. The male to female population is around 1.91 to 1, which is close to a ratio of 2:1.

Distribution of occupation:

The study found cerebral venous sinus thrombosis is most prevalent in self-employed and homemakers, followed by students and farmers. 25 (38.76%) of 64 patients were self-employed, 19 (29.69%) homemakers, 10 (15.63%) students, and 9 (14.06%) farmers.

Distribution according to the duration of stay:

Present study says hospital stays average less than 10 days. 50 of 64 patients stayed fewer than 10 days. One patient was hospitalised for over 20 days.

78% of patients were treated inside for fewer than 10 days and released with anticoagulation and biweekly for 1 month and monthly for 6 months.

Past history among study patients:

Diabetes mellitus is more prevalent in the study group than oral contraceptives and post-partum women. 8 of 64 patients had type 2 diabetes, 4 had used oral contraceptives, and 4 were post-partum.

4 (18.2%) of 22 female research participants had used OC pills and 4 (18.2%) had been post-partum.

Symptoms and signs:

The most prevalent symptom upon presentation was headache in 47 (73.4%) individuals, followed by vomiting in 37 (57.8%) and fever in 7 (10.9%).

Dehydration occurred in 22 patients (34.4%), higher functions in 3 (4.7%), motor function in 5 (7.8%), plantar extensor in 8 (12.5%), papilledema in 4 (6.3%), cranial nerves in 3 (4.7%), and acute bacterial meningitis in one (1.6%). No patient had cerebellar dysfunction.

Table 1: Symptoms and signs among the study patients:

		n = 64	**%**
Symptoms	**Headache**	47	73.4
	Vomiting	37	57.8
	Fever	7	10.9
	Unknown	12	18.8
Signs	**Dehydration**	22	34.4
	GCS ≤8	3	4.7
	Motor weakness	5	7.8
	Cranial nerve involvement	3	4.7
	Papilledema	4	6.3

	Acute bacterial meningitis	1	1.6

Blood pressure:

50 out of 64 patients had systolic blood pressure between 120 and 140 mmHg, with a mean of 131.56 and a standard deviation of 17.69.

Maximum diastolic blood pressure was below 90 mmHg (48 out of 64 study group) with 82 mmHg as mean and 9.9 mmHg standard deviation.

Table 2: Blood pressure levels among study patients:

		n = 64	**%**	**Mean ± SD**
SBP (mmHg)	<120	8	12.5	131.56 ±17.69
	120 to 140	50	78.1	
	>140	6	9.4	
DBP (mmHg)	<90	48	75.0	82 ±9.9
	90 to 100	14	21.9	
	>100	2	3.1	

Distribution of mean systolic and diastolic blood pressure according to various sites of cerebral venous sinus involvement:

Various sites of cerebral venous sinus thrombosis are compared with systolic and diastolic blood pressure. The p-values for systolic and diastolic blood pressure were 0.41 and 0.83, respectively.

Table 3: Distribution of mean systolic and diastolic blood pressure according to various sites of cerebral venous sinus involvement:

	Location	n=64	Mean BP	Standard Deviation	P value
Systolic blood pressure	Superior sagittal sinus	21	133.33	17.70	0.41
	Sup. Sagittal &Transverse sinus	3	136.67	20.82	
	Transverse/Transverse+Sigmoid sinus	21	134.29	20.14	
	Multiple sinus	19	125.79	14.65	
	Total	64	131.56	17.84	
Diastolic blood pressure	Superior sagittal sinus	21	82.86	10.07	0.83
	Sup. Sagittal &Transverse sinus	3	83.33	5.77	
	Transverse/Transverse+Sigmoid sinus	21	81.90	9.28	
	Multiple sinus	19	80.00	11.55	
	Total	64	81.72	10.01	

Biochemical profile of study patients:

25 patients (39.06%) had haemoglobin levels between 8 and 12 gm/dL, whereas 19 (29.69%) had values beyond 14. Patients' haemoglobin averages 12.5 gm/dL with a standard deviation of 3.07.

Patient hematocrit is 39.84 with a standard deviation of 8.74.

Table 4: Biochemical profile of study patients:

		n = 64	**%**	**Mean ± SD**
Hb	<8	4	6.25	12.5 ±3.07
	8 to 12	25	39.06	
	>12 to 14	16	25.00	
	>14	19	29.69	
Hct/PCV	<35	19	29.69	39.84 ±8.74
	35 to 45	28	43.75	
	>45	17	26.56	

Abbreviations: Hb: Hemoglobin; Hct: Hematocrit; PCV: Packed Cell Volume

All patients were tested for haemoglobin, hematocrit, total leukocyte count, PT/INR, creatinine, lipid profile, and liver function.

Haemoglobin mean 12.5 gm/dL with standard deviation 3.07. Hematocrit mean 39.84, standard deviation 8.74.

PT/INR averaged 1.4 with standard deviation 0.9. Creatinine mean 1.07, standard deviation 0.97.

Lipid profile parameters were total cholesterol 165.2 with standard deviation 38.02, triglycerides 152.7 with 49.84, HDL 38.81 with 7.52, and LDL 99.4 with 35.83.

Liver function test including proteins showed total bilirubin mean level 0.9 with standard deviation 0.5; direct bilirubin mean level 0.29 with standard deviation 0.14; indirect bilirubin mean level 0.61 with standard deviation 0.41; SGOT mean level 34.58 with standard deviation 17.27; SGPT mean level 34.9 with standard deviation 19.8; alkaline phosphatase mean level 93 with standard deviation 45; and albumin mean level 3.46 with standard deviation.

Table 5: Biochemical profile of study subjects:

Parameters		**Mean**	**Standard deviation**
Biochemical	Haemoglobin	12.5	3.07

profile	Haematocrit/PCV	39.84	8.74
	Total leukocyte count	10738.28	4649.04
	INR	1.4	0.9
	Creatinine	1.07	0.97
Lipid profile	Total Cholesterol	165.2	38.02
	Triglycerides	152.7	49.84
	High density lipoprotein	38.81	7.52
	Low density lipoprotein	99.4	35.83
Liver Function test	Total bilirubin	0.9	0.5
	Direct	0.29	0.14
	Indirect	0.61	0.41
	Serum glutamate oxaloacetate transferase	34.58	17.27
	Serum glutamate pyruvate transferase	34.9	19.8
	Alkaline phosphatase	93	45
	Albumin	3.46	0.34

Outcome of study patients:

Only one cerebral venous sinus thrombosis patient died, and the rest were discharged on medication with follow-up for 6 months and PT/INR monitoring.

Table 6: Outcome in study patients

Outcome	**n = 64**	**%**
Cured	63	98.44
Expired	1	1.56
Total	64	100.00

DISCUSSION –

Cerebral venous sinus thrombosis (CVST) damages brain tissue. Due to its many symptoms, it is commonly misdiagnosed. Radiologically, cerebral sinuses and veins thrombose with or without hemorrhagic infarction and edoema with or without herniation.

The present study of 64 individuals cannot provide accurate data on cerebral venous sinus thrombosis incidence or generalise the results. This study found a 1.91:1 male-to-female ratio, contrasting with earlier findings of female predominance.

Cantu et al. (1996) found high rates of post-partum CVST in Mexico due to referral bias.

Studies did not reveal this significant post-partum prevalence with Deschiens et al., 1996 and Daif et al., 1995. State and clinical profile differences may explain it. New antibiotics have decreased the septic aetiology of cerebral venous sinus thrombosis.

Cerebral venous sinus thrombosis is more prevalent in underdeveloped nations and linked to dehydration, sedentary lifestyle, puerperium, oral contraceptives, and rarely infection.

Biochemistry, pathology, brain magnetic resonance imaging, and venogram reports have improved CVST diagnosis, risk factors, and therapy. We evaluated age, gender, clinical profile, risk factors, involved venous sinuses (for thrombosis), and neuroimaging investigations with other Indian and international research.

Age:

64 patients aged 18–80 years were enrolled in this research. Male patients predominated. It happens more in their 30s and 40s. Brain MRI with venogram diagnoses CVST in all.

The study comprised 64 cerebral venous sinus thrombosis patients, 42 (65.6%) men and 22 (34.4%) females with a mean age of 37.7 years and standard deviation of 13.39 years. Males averaged 38.7 years with SD ± 14 and females 35.9 years with SD ± 11.8.

Few studies showed slightly higher age group for cerebral venous sinus thrombosis. Y Sidhom et al. studied 41 patients, 28 females and 13 males, with mean ages of 51.2 years (standard deviation 17.9 years) for men and 36.6 years and 13.4 years for females. Males are older than females. (Sidhom et al., 2014)

Retrospective investigation at the Diagnostic Radiology Department of Central Clinical Hospital of the Ministry of Interior in Warsaw from August 2009 to March 2015. Jerzy Walecki et al. evaluated 34 patients, 22 female and 12 male, with a mean age of 48.7 years and a range of 27–77 years. Females are younger (47.9 years) than men (50.3 years). This study found larger prevalence in the fifth decade than the present study. (Walecki et al., 2015)

Stolz, Rahimi et al. found that age is a poor predictive predictor, but this investigation found no statistically significant connection (Preter et al., 1996, Stolz et al., 2005).

Ferro JM et al. research identified multivariate predictors of death as age above 37, male gender, mental status abnormality, haemorrhage on arrival CT head, coma, deep cerebral venous system thrombosis, and malignancy (Mehndiratta et al., 2006).

Gender:

Male predominance was revealed by the survey, with a male: female ratio of 1.91: 1. The current study's findings are analogous to those of Daif et al, in whom there are exactly as many men as women.

Male to female ratio in Appenzeller et al's study of 24 patients was 1: 3.115, with 18 female patients and 6 male individuals.22 female cases and 12 male patients were evaluated by Jerzy Walecki et al., and the male to female ratio was 1: 1.83 (Walecki et al., 2015).

Out of 490 stroke patients, Mehndiratta et al. evaluated 6 CVST patients, comprising 4 females and 2 men, with a male to female ratio of 1:2.118. 81 patients were included in the study by Banakar et al., ranging in age from 18 to 70 years, with a male: female ratio of 1: 3.76.119. The male: female ratio in Sidhom et al's study of 41 patients was 1: 2.15.122 There were 28 female patients (68%) and 13 male patients (28%) in total.

In this study, there is no statistically significant correlation between gender and the prognosis of cerebral venous sinus thrombosis. Contrarily, research by Jose M. Ferro et al. found that the predictive value of male sex for CVST was low (Mehndiratta et al., 2006).

A pathology investigation found that 9.3% of 182 consecutive corpses had CVST, but before this study, no population study has been able to determine the incidence of CVST

Clinical profile

CVST symptoms vary. In this study, headache, vomiting, thirst, fever, extensor plantar, seizures, motor involvement, papilledema, and altered sensorium were the most prevalent signs and symptoms.

This study had a comparable percentage of symptoms. Bankar BF et al studied 81 patients and found that 82.7 percent had headaches, similar to Daif et al (82%), Einhaupl (91%), Ameri and Bousser (74%), Nagarja (94.4%), Vishwanath (94%), and Halesh (95%). (Banakar & Hiregoudar, 2017, Daif et al., 1995, K et al., 2014, Rajkondawar & Bhilare, 2023). PatilVC et al. found 91.8% headache, 24% hemiplegia, and 76% dehydration in 32 cases (Patil et al., 2014). Pfefferkorn et al. found 81% headache and 72% reduced consciousness.Mohapatra S. et al. found 77% headache, 25% seizures, 33% altered sensorium, and 17% neurological

deficit in 36 patients. This investigation demonstrated similar results to Appenzeller et al. At 8 weeks, altered sensorium and focal neurological deficit are statistically poor prognostic indicators.

Seizures were 62%, focal impairments 63%, papilledema 37%, and altered sensorium 54% in Basavaraj et al. Azin et al found headache in 91.8% of 61 patients (Ahmad, 2017). Appenzeller et al found headache in 75% and vomiting in 33% of 25 cases (18 females and 6 males) (Appenzeller et al., 2005). Pai et colleagues examined 612 cases (354 males, 219 females, 39 children). which included headache (62%), papilledema (62%), hemiparesis (48%), seizures (31%), and cranial nerve palsy (7%)(Pai et al., 2013). Highighi et al studied 465 patients aged 29.5 to 43.8 years with a male:female ratio of 1:1.

Risk factors

Thrombosis results from any condition that alters the Virchow triad of aberrant blood flow, endothelial damage, and hypercoagulability. Endothelial integrity matters most. Endothelium injury can change blood flow and coagulability. Stasis or turbulence can damage endothelium. These may cause thrombosis alone or together.

CVST causes 10%–20% of young adult strokes. Thrombosis of the cerebral veins can induce localised impairments from venous blockage and more generalised consequences from blocked main sinuses increasing CSF pressure.

Only a few patients had coagulation profile and hyperhomocysteinemia tests due to financial constraints.

In this study, puerperium (4 out of 22 females) [18.2% of female population], oral contraceptive pills (4 out of 22 females) [18.2% of female population], dehydration (22 out of 64) [34.4% of study population], procoagulopathies including anti-thrombin III deficiency (2 out of 12) [16.6%], protein C or S deficiency (2 out of 12) [16.6%], lymphoma (1 out of 64) [1.56% of study population], hyperhomocysteinemia (4 out of 13) [30.7%], and leukocytes.

Mohapatra S et al. studied 36 patients, 22 of whom were female, 15 of whom were pregnant (68%). Pregnancy increases CVST risk, although outcomes are similar to non-pregnant women. AB Haghighi et al. studied 465 patients and collected cumulative data from published Iranian research in a methodical manner. Oral contraceptive usage was the single most important risk factor in all series (Borhani Haghighi et al., 2012). Azin et al. studied 61 CVST patients using MRI brain or cerebral angiography. Oral contraceptives were the biggest CVST risk factor in their study. OC pill use caused 62.2% of male-to-female instances (1:3.1).

Kalita J et al. studied 33 patients, 23 of whom were female. Risk factors were pregnancy, multi-parity, and infection, and predisposing factors were pregnancy and puerperium in 6, OC pill use in two, infections in six, and dehydration and jaundice in one each. 23% had elevated anticardiolipin antibody, 15% protein C deficit, 70% protein S deficiency, and no factor V Leiden mutation (Kalita, 2006).

Venous sinus:

Out of 64 patients, 21 had only superior sagittal venous sinus, 21 had transverse sinus venous alone or with sigmoid venous sinus, 19 had more than 2 sinuses, and 3 had both.

The superior sagittal venous sinus was affected in 60.9% of patients, followed by the transverse sinus in 70.3%. In 54.7% of instances, sigmoid sinuses alone or with others follow. Multiple sinus involvement 29.7%, transverse and sigmoid sinus 26.6%, transverse alone 6.25%, and superior sagittal and transverse 4.7%. The following details were found in a CVST investigation of 64 patients:

1. The transverse sinus alone or with other sinuses involved 45 times (70.3%), 28 times (62.3%) on left side, and 17 times (37.7%) on right side.
2. 39 instances (60.9%) included the superior sagittal sinus alone or with others.
3. 35 instances (54.7%) affected the sigmoid sinus, 28 (80%) on the left side and 7 (20%) on the right.
4. Occurrences (6.25%) included the straight sinus.
5. One instance (1.56%) included the inferior sagittal sinus.

The other findings include -

1. The internal jugular vein was implicated in roughly 18 instances of cerebral venous sinus thrombosis (28.1%).
2. Three instances with involvement of internal cerebral vein (4.7%).
3. Five hemorrhagic infarcts (7.8%) occurred.
4. Two subarachnoid haemorrhages (3.1%).

Wysonika et al. compared venous sinus involvement. In their investigation, transverse sinuses impacted 79%, sigmoid 50%, superior sagittal 49%, and two or more sinuses 66% (Wysokinska et al., 2008).

Most investigations demonstrate cerebral venous sinus thrombosis occurs in the superior sagittal sinus. According to Mohapatra S et al., MRI sinus venous thromboses were 89% superior sagittal, 75% lateral, and 20% straight. Basavaraj et al. found that out of 81 cases, superior sagittal sinus was involved in 74.1%, either alone or with other sinuses, followed by right transverse (42%), left transverse (38.3%), sigmoid (34.6%), and straight sinus (22.2%)(Banakar & Hiregoudar, 2017). Ameri and Bousser reported 72% and Daif et al. 85% superior sagittal sinus involvement (Daif et al., 1995). Patil VC et al. found that 23 (46%) of 50 patients had superior sagittal sinus involvement, 16 (32%) had sigmoid alone or with transverse sinus, and 10 (20%) had numerous sinuses (Patil et al., 2014)

Outcome of the study:

Most patients had good prognoses after therapy. 64 patients were released without morbidity, however one died (1.56%). Sinuses do not affect patient outcome. Male sex is bad outcome factor but not statistically significant. Other research cannot be supported by this study's conclusion.

AB Haghighi et al. studied 465 patients with 11.4% mortality. Haematological malignancies, Barthel index, and modified Rankin scale were not examined.117 Patil VC et al. studied 50 individuals with 16% mortality. In females, superior sagittal sinus thrombosis increased case mortality, whereas in men, many sinuses increased it. Males die more. Eight patients—four of

each gender—died (Patil et al., 2014). Pai et al. found 13% CVST-related deaths in 612 patients. Early diagnosis and anticoagulation therapy lower CVST mortality to 13%.134Y Sidhom et al. studied 41 patients with 7.3% mortality. Most patients were functionally independent (83%), although a few (10%) were not relied on.

The ISCVT trial found 4% discharge mortality and 8% follow-up mortality. 13% CVST instances are high-risk (Mehndiratta et al., 2006). In 79 individuals investigated by Stolz et al., more than two seizures despite antiepileptic medication were related with poor result, while patients with headache history had a better prognosis although not statistically significant (Stolz et al., 2005)

With lower mortality, better diagnosis has identified more and less severe illnesses with benign course. One patient died during therapy, while the others recovered.

CONCLUSION –

Cerebral venous sinus thrombosis was more prevalent in men in their 30s and 40s. Dehydration, oral contraceptive pill usage, and post-partum status were related with CVST, while headache and vomiting were the most prevalent symptoms. CVST affected transverse sinuses more often in this research. One third of patients showed aberrant protein C, protein S, and anti-thrombin III levels, a risk factor for cerebral venous sinus thrombosis. If recognised and treated early, cerebral venous sinus thrombosis is a preventable, treatable, and better-outcome CNS illness. Cerebral venous sinus thrombosis is managed with proper hydration, infection treatment, and anticoagulant medication.

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