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CEREBRAL VENOUS THROMBOSIS AND DEPRESSION: A SCOPING REVIEW

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Ключові слова: *тромбоз церебральних вен, депресія, супутні захворювання, результати, огляд*

Abstract. Cerebral venous thrombosis and depression: a scoping review. Feras M. Almarshad, Dushad Ram. *Cerebral venous thrombosis is a rare condition involving thrombus formation in the venous sinuses of the brain, leading to impaired venous drainage, increased intracranial pressure, and brain damage. Depression frequently accompanies cerebral venous thrombosis patients with varying prevalence and characteristics across studies. This scoping review aims to synthesize current evidence on the prevalence and characteristics of depression among cerebral venous thrombosis patients, identify patterns of sinus involvement, and assess the impact on clinical and psychiatric outcomes. This study searched PubMed/MEDLINE, Embase, Scopus, Web of Science, and Google Scholar databases for case reports,*

retrospective studies, and clinical trials published within the last 20 years in articles related to depression and cerebral vein thrombosis. This review covered demographics, clinical characteristics, structural involvement, and outcomes. The prevalence of depression in patients with cerebral venous thrombosis ranged from 13% to 58.4%, influenced by factors such as pattern of venous sinus involvement, other body systemic involvement, and individual characteristics. Patients were predominantly younger to middle-aged adults, with a significant female predominance. Common comorbidities were anemia, hyperhomocysteinemia, migraines, and hypertension. Most patients had favorable outcomes; however, persistent residual symptoms and variable clinical presentations were also noted, affecting long-term quality of life. The review highlights the need for standardized assessments and a multidisciplinary approach to cerebral venous thrombosis management, addressing both neurological and psychiatric aspects. Further research with larger, standardized studies is necessary to better understand the relationship between cerebral venous thrombosis and depression and to improve patient outcomes.

Реферат. Церебральний венозний тромбоз і депресія: оглядове дослідження. Ферас М. Альмаршад, Душад Рам. *Церебральний венозний тромбоз – це рідкісний стан, що включає утворення тромбів у венозних синусах мозку, що призводить до порушення венозного відтоку, підвищення внутрішньочерепного тиску та пошкодження мозку. Депресія часто супроводжує пацієнтів з тромбозом церебральних вен з різною поширеністю та характеристиками, які описано в різних дослідженнях. Цей огляд має на меті узагальнити поточні дані щодо поширеності та характеристик депресії серед пацієнтів з церебральним венозним тромбозом, виявити закономірності ураження носових пазух та оцінити вплив на клінічні та психіатричні результати. У цьому дослідженні було здійснено пошук у базах даних PubMed/MEDLINE, Embase, Scopus, Web of Science та Google Scholar за звітами про випадки, ретроспективними дослідженнями та клінічними дослідженнями, опублікованими протягом останніх 20 років у статтях, пов'язаних з депресією та тромбозом судин головного мозку. Цей огляд охоплював демографічні та клінічні характеристики, структурну залученість та результати. Поширення депресії в пацієнтів з церебральним венозним тромбозом коливалося від 13% до 58,4% під впливом таких факторів, як ураження венозних синусів, інше системне ураження організму та індивідуальні особливості. Це були переважно дорослі люди молодшого та середнього віку, зі значним переважанням жінок. Поширеними супутніми захворюваннями були анемія, гіпергомоцистеїнемія, мігрень та артеріальна гіпертензія. У більшості пацієнтів результати були сприятливими, однак також відзначалися стійкі залишкові симптоми та варіабельні клінічні прояви, що впливають на довгострокову якість життя. В огляді наголошується на необхідності стандартизованих оцінок та мультидисциплінарного підходу до лікування церебрального венозного тромбозу, що охоплює як неврологічні, так і психіатричні аспекти. Необхідні подальші дослідження з більш масштабними, стандартизованими дослідженнями, щоб краще зрозуміти взаємозв'язок між церебральним венозним тромбозом і депресією та покращити результати лікування пацієнтів.*

The incidence of Cerebral Venous Thrombosis (CVT)is 1.2-12.1 per million [1] worldwide, and though a less common yet increasingly diagnosed stroke subtype that primarily affects young adults[2]. Recently, the international community on CVT emphasized prioritizing research ranging from understanding global epidemiology to improving post-CVT quality of life [2]. Advancements in CVT management have reduced mortality rates, but many patients still experience physical and psychological symptoms due to various factors, requiring identification and treatment[3]. Among psychological symptoms, altered mental status at presentation is known to have adverse outcomes [4, 5]. Depressive symptoms are common in stroke patients, including all types [6], and one-third of those with cerebral venous thrombosis also experience depression [7].

On the other hand, depression has been linked to a higher risk of deep vein thrombosis [8]. Studies on non-cerebral venous thrombosis have suggested a bidirectional link between venous thrombosis and depression, as supported by population-based cohort [9], genetic [10], and hospital-based studies [11]. Review articles rarely explore the link between cerebral venous thrombosis and depression, primarily focusing on stroke and depression, including non-cerebral venous thrombosis patients [12]. There seem to be notable differences in the outcome of cerebral venous thrombosis and arterial venous thrombosis [12, 13, 14]. This scoping review aims to synthesize existing literature on the relationship between depression and cerebral vein thrombosis, as studies show depression negatively impacts overall outcomes and quality of life. The review assesses the prevalence, comorbidities, clinical characteristics, and outcomes of patients with depression and CVT. This study could offer valuable insights into the demographic and clinical aspects of comorbid depression and CVT, aiding in the identification and need for intervention.

MATERIALS AND METHODS OF RESEARCH

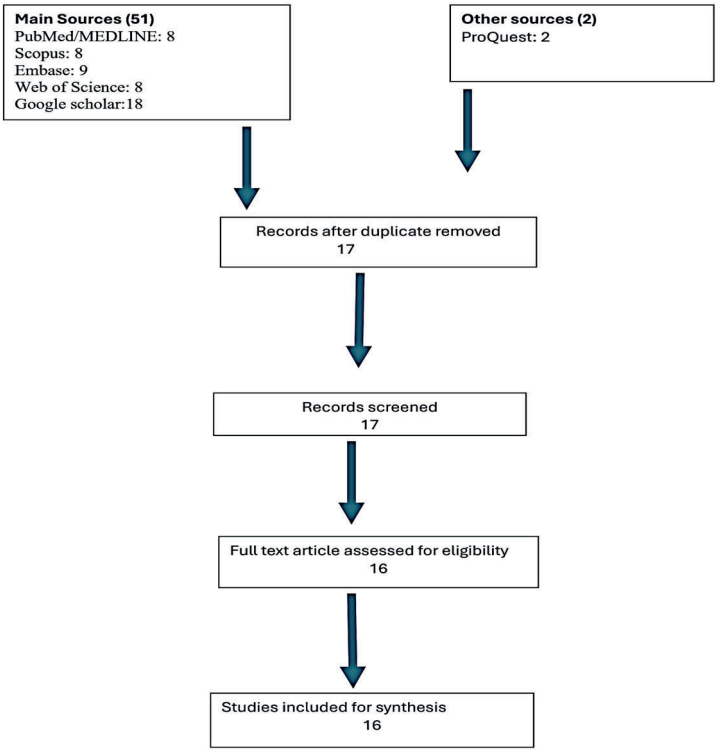
For this study, the population has been defined as patients diagnosed with cerebral venous thrombosis (CVT). Depression is considered present if it is mentioned in terms of clinical features or with the use of severity measures or a history of depression. For this review, the study types included were case reports, case series, observational studies, cohort studies, and clinical trials. The outcome was considered as a clinical association between depression and CVT, treatment outcomes, and prognosis. The primary databases used in

the search were PubMed/MEDLINE, Embase, Scopus, Web of Science, and Google Scholar. The main search term used was "Depression" AND "Cerebral Vein Thrombosis." During the search, the following synonyms were also used: 1) for depression: depression, major depressive disorder, depressive symptoms; 2) for cerebral vein thrombosis: cerebral vein thrombosis, cerebral venous thrombosis, cerebral sinus thrombosis, dural sinus thrombosis, cerebral venous sinus thrombosis, CVT. ("Depression" or "Depressive disorder" or depression or "Depressive symptoms" or "Major depressive disorder") and ("Cerebral vein thrombosis" or "Cerebral sinus thrombosis" or "Dural sinus thrombosis" or "Cerebral venous thrombosis" or "Cerebral vein thrombosis" or "Cerebral venous sinus thrombosis" or CVT).

Articles were included in this study (case reports, retrospective, observational studies, and clinical trials, and published within the last 20 years) if they were published in peer-reviewed journals, studies involving human subjects, published in English, and studies discussing the relationship between depression and cerebral vein thrombosis. Articles were excluded if they were animal studies or focused solely on other forms of thrombosis without specific mention of cerebral vein thrombosis, focusing solely on pediatric populations unless relevant to the research question, and articles not addressing any link between depression and CVT. The research adhered to the bioethical principles outlined in the Helsinki Declaration on "Ethical principles for medical research involving human subjects" and the "Universal Declaration on Bioethics and Human Rights" by UNESCO.

Independent reviewers extracted the data from the included studies using a standardized data extraction form (author DR) and were cross-checked by another author (FA). The extracted data were: study characteristics (author, year of publication, study design, sample size), participant characteristics (age, gender, comorbidities), main findings related to the relationship between depression and CVT, treatment approaches and outcomes and quality assessment of the studies using appropriate tools (e.g. – Newcastle-Ottawa Scale for observational studies). The findings from the included studies were synthesized narratively, with a focus on study designs and demographics, comorbidities, clinical presentation, prevalence of depression, structural involvement and imaging findings, and outcome measures.

A total of 51 records were identified (PubMed/MEDLINE =8, Scopus =8, Embase =9, Web of Science =8, Google Scholar =18 and ProQuest =2). Seventeen unique records remained for further screening after removing duplicates, and after assessment of the full text of these articles, 16 met eligibility criteria and were included in the final synthesis (Fig.).



PRISMA Flow diagram for study selection

RESULTS AND DISCUSSION

In this scoping review, various types of studies were included, predominantly retrospective and cross-sectional approaches, with one ambispective study, case studies. Some small-scale studies, such as by Teixeira [17] and Buccino et al. [29], included relatively small cohorts (13 and 34 patients, respectively), which provided insights into specific subgroups but with limited generalizability. There was a relatively large cohort by Meher et al. [16], who studied 225 participants, offering more robust data on the prevalence of comorbid conditions and depression among CVT patients (Table).

Scoping review articles of Cerebral Venous Thrombosis and Depression

SN	Author(s) and year	Study design (N); age	Comorbidity	Clinical presentation	Prevalence of depression in CVT patients	Sinus involved	Other predominant findings	Outcome measure	Assessment time
	Patwardhan et al., 2024 [15]	Retrospective (N=26); Mean age – 29 Male - 8 Female - 21	Anaemia, Hyperhomocysteinemia, B12 deficiency, Thrombocytosis, puerperium, Gynaecological issue treated with contraceptive, Alcohol	Headache, Vomiting, Hemiparesis, Seizures, Motor/sensory deficits	PHQ 9= 16%	SS, VEIN of Galen	Hemorrhagic/ Venous infarction	mRS score 0-1=69%	Median: 5.32 years
	Meher et al. 2024 [16]	Ambispective study (N=225); Median age – 30 Male – 108 Female - 117	DM, HT, Migraine, Smoking, Alcohol use, Obesity, Anaemia	Seizures, Headache, Vomiting, Limb weakness	58.4% HDRS-9±4.8	SSS>TS>SS>ST	Infarction/ Haemorrhagic lesion	11 deaths, Dependent - 20 (mostly moderate) mRS at follow-up: 0-=94.1%	Mean: Retrospective group 31.5 months; Prospective group 12 months
	Teixeira et al , 2023 [17]	Retro spective (N=13); Mean age – 45 Male - 7 Female -41	? HT, Migraine	Headache, Seizures, Motor/sensory deficits	HADS 23%			All mRS scores 0	6 months
	Malone et al., 2023 [18]	Age - 19 Gender - F	Severe microcytic anaemia, oral contraceptives	Anxiety, Depression, Bulimia (purge), Generalised seizures, Head banging	Clinical	SSS	Bilateral cortical petechial hemorrhages,	mRS score – 1	Initial evaluation
	Pleșa et al, 2023 [19]	Age - 23 Gender - Female	Pregnancy, hypochromic microcytic anemia, left iliofemoral - popliteal thrombosis, moderate pulmonary embolism, thrombophilia	Rt ipsilateral arm and leg weakness	Clinical	SS	Rt parieto-occipital hemorrhage	mRS score – 0	Initial evaluation
	Pleșa et al, 2023 [19]	Age - 36 Gender - Female	Obesity, hypertension, left maxillary sinusitis, thrombophilia	Intense headaches, dizziness, nausea, vision difficulty, focal sensory symptoms	Clinical	bilateral (left > right) cavernous sinus thrombosis	NONE	mRS score – 2	Initial evaluation
	Benerji et al., 2022 [20]	Age - 30, Gender - F	None	Loss of consciousness, Involuntary movements of limbs, up rolling of the eyes	HAM-D-19	SSS, Rt TS	Hemorrhagic infarctions in the left frontal and parietal lobes	mRS score – 0	Initial evaluation

SN	Author(s) and year	Study design (N); age	Comorbidity	Clinical presentation	Prevalence of depression in CVT patients	Sinus involved	Other predominant findings	Outcome measure	Assessment time
	Saroja et al., 2019 [21]	Cross-Section (=100); Mean age – 35 Male – 60 Female - 40	Hyperhomo-cysteinemia, Anaemia, Alcohol/ Tobacco use, Pregnancy, Hormonal treatment, Thrombophilia	Headache, Generalized Seizures	30%, mostly Mild HAM-D	Multiple sinus involvement (76%); superficial venous sinus system (89%)	Cerebral infarctions (Left > Right)	mRS at discharge: ≤2=86%; ≥3=14% SA-SIP total score: 5.09±4.67	1 year after the discharge
	Hiltunen S, 2018 [22]	Retrospective (N=161); Median age - 38 Male - 55 Female - 106	DM, Cancer, Infection, Smoking, Anaemia, Coagulopathies, OC use, pregnancy	Headache, Visual disturbance; Seizures, Focal symptoms and signs	BDI 21%	Involvement of all types of sinuses TS>SSS>SS	Infarction/ Haemorrhagic lesion	Mortality = 4% mRS at follow-up: ≤2=83%	Mean: 39 months
	Lindgren et al.,2018 [23]	Retro-spective (N=62); Median age - 41 Male - 3 Female -38	Gynecological issues treated with hormones, Puerperium, Thrombophilia ? HT	Headache, Seizures, Motor/ sensory deficits	HAD 55%	TS>SSS>SS (usually multiple sinuses at a time)	Infarction/ Haemorrhagic lesion	mRS score 0-2=87.1%; >2=12.9%	Median: 135 months
	Hiltunen S, 2016 [24]	Retro-spective (N=161); Mean age - 38 Male - 55 Female - 106	Infection, Malignancy, Coagulopathy, Systemic disorder, OC use	Focal symptoms, headache	BDI 19%	SS+LS	Infarction/ Haemorrhagic lesion	Mortality-10%. 84% scoring 0–1 on the mRS; residual symptoms in 42 %	7 years
	Iannac-chero et al, 2014 (25]	Age - 30, Gender - F	Hyperomocis-teinemia, DUB (on oral contraceptive) Botulinum the-rapy - Migraine, Prothrombin mutation	Chronic headache (migraine)	Zung-Dep-ression Rating Scale - 37%	Lt TS	None	mRS score 0	Initial evaluation
	Bugni-court et al., 2012 [26]	Cross sectional (N=52); Mean age - 37 Male - 6 Female – 46	? HT	Headache, Seizure, Motor/ sensory deficits	MADRS 13%	TS> SSS	Infarction/ Haemorrhagic lesion (Left > Right)	mRS score 0-23%; 1-2=61%; ≥3=15%	Mean: 22 months
	Bugni-court, et al., 2011 [27]	Cross sectional (N=43); Mean age - 40 Male - 11 Female -32	? HT	Headache, Vomiting, Hemiparesis, Seizures, Motor/ sensory deficits	MADRS 16%	TS>SSS>Cor-tical vein>Straight sinus	Infarction/ Haemorrhagic lesion (Left > Right)	mRs < 2=95%	Mean: 24.9 months
	Koopman, 2009 [28]	Case-control study (N=44); Median age - 40 Male - 8 Female -36	Thrombophilia, Hormonal treatment for gynecological issues, Pregnancy, Malignancy, Immune disease, Infection	Headache, Visual disturbance, Seizures, Motor/ sensory deficits, Nausea/ vomiting	CES-D 30%	Involvement of all types of sinus, particularly LS>SSS	Infarction/ Haemor rhagic lesion	mRS score 1-2=69%, restscored 0.	>12 months
	Buccino et al., 2003 [29]	Retro-spective (N=34); Mean age - 38 Male - 3 Female - 35	Gynecological issue (hormonal treatment)? HT	Headache, Epileptic seizures, Visual deficits	BDI 18%	SSS+LS		mRS score 0-100%	Median: 3.5 years

Notes: BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; DM = Diabetes mellitus; DUB = Dysfunctional Uterine Bleeding; HAD = Hospital Anxiety and Depression Scale; HAM-D = Hamilton Depression Rating Scale; HDRS = Hamilton Rating Scale for Depression; HT = Hypertension; LS = Lateral Sinus; MADRS = Montgomery-Åsberg Depression Rating Scale; MOCA = Montreal Cognitive Assessment; mRS = Modified Rankin Scores; OC = oral contraceptive; PHQ-9 = Patient Health Questionnaire-9; SQL = stroke-specific quality of life; SS = Sagittal sinuses; SSS = Superior Sagittal sinuses; TS = Transverse sinus.

Demographics

Median/mean age across studies ranged from 19 to 45 years, with an overall trend towards younger to middle-aged adults. Gender distribution varied with studies (e.g., Lindgren et al.) [23] showed a significant female majority (38 out of 41 participants); Patwardhan et al. [15] reported a more balanced distribution, even if with a slight female predominance. However, overall, the studies have included predominantly female cohorts, which appears to reflect the impact of gender-specific risk factors such as hormonal influences and pregnancy-related complications (Table).

Comorbidities

The presence of comorbidities suggests a multifactorial nature of CVT. Across the multiple studies, common comorbid conditions included anemia, hyperhomocysteinemia, migraines, diabetes mellitus (DM), hypertension (HT), and lifestyle factors such as smoking and alcohol use. The presence of coagulopathies, gynecological issues, and infections also featured prominently. Among females, hormonal influences (e.g., oral contraceptive use, pregnancy, and hormone replacement therapy) were frequently associated with CVT, highlighting the role of estrogen-related thrombophilia. Some studies noted systemic conditions such as malignancy, immune diseases, and severe microcytic anemia as contributory factors, suggesting a broad interplay of systemic health on cerebral venous thrombosis (Table).

Clinical Presentation

Most patients with CVT across the study presented with a group of neurological symptoms. Headache was most commonly reported, with a range of severity from mild to severe. A significant number of patients experienced seizures (generalized and focal seizures). For instance, Meher et al.[16] reported seizures as a major symptom alongside headaches. Motor and sensory deficits as presentation symptoms included hemiparesis, sensory loss, and other focal neurological deficits, suggesting the impact of venous congestion and infarction on cortical and subcortical structures. Other neurological symptoms were visual disturbances, vomiting, loss of consciousness, and specific psychiatric manifestations such as anxiety and bulimia in a minority of cases [18] (Table).

Prevalence of Depression

Prevalence rates of depression in CVT patients ranged from 13% [26] to as high as 58.4% [16]. Depression severity also varied, with some studies indicating mild depression as the predominant form, e.g., Saroja et al. [21], while others reported moderate to severe depression linked with worse functional outcomes. Across different studies, depression was assessed using various scales, including PHQ-9, HDRS, HADS, HAM-D, CES-D, Zung Depression Scale, and MADRS. This variability could be attributed to differences in population characteristics, assessment tools, and clinical settings (Table).

Sinuses Involved

The superior sagittal sinus (SSS), transverse sinus (TS), and sigmoid sinus (SS) were frequently involved. Multiple sinus involvements were noted in several studies, suggesting a widespread impact on cerebral venous drainage. Some studies identified specific involvement patterns, such as the Vein of Galen [15] or cortical veins [27], reflecting the variability in venous anatomy affected in CVT patients.

Other imaging findings

Infarction and hemorrhagic conversion were common, with several studies highlighting a left-sided predominance in infarctions. This was consistent with the pathophysiology of venous congestion and subsequent parenchymal damage. Bilateral cortical petechial hemorrhages were observed in some cases, such as Malone et al., [18], underscoring the potential for widespread cortical involvement in severe cases (Table).

Outcome Measures

A majority of patients had favorable outcomes with mRS scores of 0-2, indicating minimal to mild disability. For instance, Hiltunen [24] reported that 85% of patients had mRS scores ≤ 2 at follow-up. Mortality rates were generally low, ranging from 4% to 10%, depending on the study. Some patients, however, exhibited moderate to severe disability, highlighting the heterogeneity in clinical outcomes. Several studies reported persistent residual symptoms, even among those with low mRS scores, pointing to the potential long-term impact of CVT on quality of life (Table).

Assessment Time

Initial evaluations often occurred within days or months post-diagnosis, capturing early functional outcomes and the immediate impact of therapeutic interventions. Some studies conducted long-term follow-ups extending to several years, such as Lindgren et al. [23], with a median follow-up of 135 months. These extended assessments provided insights into the chronic impact of CVT and the persistence of symptoms of depression (Table).

This scoping review highlights the complex interplay between cerebral venous thrombosis and depression, with a significant proportion of CVT patients experiencing depression. There was wide variability in prevalence rates with the involvement of multiple venous sinuses and the presence of hemorrhagic or infarct lesions, which appears to be influenced by both neurological and psychiatric outcomes.

Prevalence of Depression

The presence of depression ranges from 13% [26] in France to 58.4% [16] in India. In general, population-based studies suggest a link between deep venous thrombosis (not specific to CVT) and depression, with a prevalence of 10.3% [9]. The presence of depression itself is a risk factor for CVT and may be diagnosed at presentation [30]. With regard to higher rates in India, earlier Indian literature hardly focused on the psychological outcomes [30], and Meher et al.[16] included the maximum number of patients. The relationship between depression and CVT appears to be complex, and so does the reported underlying mechanism. The review suggests a bidirectional relationship between microvascular dysfunction (MVD) and depression, each worsening the other, and underlying mechanisms may include HPA axis dysfunction, proinflammatory cytokines, and platelet hyperactivation [31]. The review also suggests that platelet pathophysiology has strong implications for the occurrence of MDD and its related comorbidities [32]; even NADPH-oxidases have been proposed for the treatment of thrombus-associated depression [33]. On the other hand, antidepressants such as Serotonergic antidepressants increase the risk of bleeding and reduce the risk of cardiovascular and thrombotic events [34]. The high prevalence in the Indian population appears to be linked to the assessment method. Studies did not specific about whether a standardized tool is used in the Indian context as there is a cultural and perception variation with regard to depression [35, 36]. The unique etiological factors of CVT also vary with geographical locations. There are reports that Europeans and Asians may have unique etiological contributors that may play important roles in occurrence and consequences [37, 38]. Differences in the prevalence of several comorbidities associated with comorbid depression and cerebrovascular thrombosis, may have also a role to play [2, 39, 40]. We could not be able to comment on the severity of depression and CVT as details were inadequate.

Sinuses Involved

The superior sagittal sinus (SSS), transverse sinus (TS), and sigmoid sinus (SS) are frequently involved in CVT. In general, such a pattern has been reported, irrespective of the presence of depression [35]. Though not specific to individual sinuses, cerebral venous outflow disturbance is linked to developing anxiety and depression as a consequence of cerebral injury [42].

Multiple sinus involvements suggest a widespread impact on cerebral venous drainage, which could exacerbate neuropsychiatric symptoms, including depression. Variability in specific involvement patterns, including the Vein of Galen [15] and cortical veins [27], could lead to diverse clinical presentations, including mood disturbances. Impaired cerebral venous drainage from CVT can lead to increased intracranial pressure and brain parenchymal changes, which may contribute to the development of depressive symptoms. The presence of cortical vein involvement might specifically impact areas of the brain associated with mood regulation, such as the frontal lobes. The involvement of multiple venous structures could result in ischemic changes, hypoxia, or hemorrhage in regions associated with mood and cognition. These alterations might contribute to neuropsychiatric manifestations, including depression.

Other imaging findings

Infarction and hemorrhagic conversion are common outcomes in CVT due to disrupted venous outflow and resultant ischemic injury [36, 37]. Studies, including Malone et al. [18], highlight a left-sided predominance in infarctions, aligning with the pathophysiology of venous congestion. Consistent observation of left-sided infarctions suggests that left hemisphere involvement, particularly the frontal and temporal lobes (due to their role in language and mood regulation), may have a unique impact on mood disorders such as depression [38, 39]. In general, the review suggests that the stroke of the left hemisphere more commonly develops depression than the right side [47, 48].

Outcome

A majority of patients with CVT have favorable outcomes, with modified Rankin Scale (mRS) scores of 0-2, indicating minimal to mild disability (e.g., the study by Hiltunen [22] reported that 83% of patients had mRS scores ≤ 2 at follow-up, suggesting a good functional recovery in most cases. Similarly, mortality rates were low, ranging from 4% to 10%, depending on the study, suggesting that while CVT can be a serious condition, the risk of death is relatively low, contributing to the generally positive prognosis for many patients. Despite this, there is heterogeneity in clinical presentations and outcomes. Some patients may exhibit moderate to severe disability, reflecting the variability in how CVT affects individuals. Several studies have reported persistent residual symptoms in patients with CVT, even among those with low mRS scores (0-2), that include headaches, fatigue, cognitive impairments, and other neurological deficits, which may persist long after the acute phase of CVT and can have a significant impact on quality of life, potentially contributing to psychological conditions such as depression.

CONCLUSIONS

1. Prevalence of cerebral venous thrombosis with comorbid depression ranges from 13% to 58.4%, predominantly affecting people aged 19-45, younger to middle-aged adults with a notable female predominance, likely due to hormonal influences, pregnancy,

and contraceptive use. Mild severity of depression is the most common, with moderate to severe cases linked to poorer outcomes.

2. The sinuses commonly involved include the superior sagittal, transverse, and sigmoid with associated infarctions and hemorrhagic conversion, primarily due to venous congestion.

3. Overall, most patients experience mild disability, and the mortality rate is low, though some also experience moderate to severe disability and persistent symptoms affecting long-term quality of life.

4. Management should consider a comprehensive approach that should include both neurological and mental health support in order to optimize patient outcomes and address the significant impact of residual symptoms on quality of life.

5. The variability in depression prevalence rates necessitates further research with larger, standardized studies to better understand the long-term implications.

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