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Malnutrition and Cerebral Intraparenchymal Damage In Patients With Thrombosis Of Dural Sinuses And /Or Cerebral Veins

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Abstract

Introduction: Malnutrition is a complex and multifactorial condition characterized by an imbalance in nutrient intake, absorption, and utilization, leading to adverse effects on physical and cognitive health. Objectives: The main objective of the study is to find the role of malnutrition and cerebral intraparenchymal damage in patients with thrombosis of dural sinuses and cerebral veins. Material and methods: This retrospective observational study was conducted in tertiary care hospital of Hyderabad, Jamshoro and Nawabshah from December 2022 to November 2023. Data were collected from 205 patients. A comprehensive search of electronic medical records was conducted to identify eligible patients diagnosed with thrombosis of dural sinuses and/or cerebral veins (TDS/CV). Relevant demographic information, clinical characteristics, imaging findings, and nutritional status data were extracted from the medical records of eligible patients. Results: Data were collected from 205 patients from both genders. There were 54% male and 46% female patients. Mean age of the patients was 45.01±12.3 years. Imaging findings revealed cerebral intraparenchymal damage in 60% of patients, with ischemic infarction, hemorrhage, and edema observed in 40%, 20%, and 10% of cases, respectively. 35% of patients were classified as malnourished, while 45% were deemed at risk of malnutrition. BMI < 18.5 kg/m² was observed in 25% of patients, indicating undernutrition based on body mass index criteria. Additionally, 40% of participants had a Mid Upper Arm Circumference (MUAC) below the 5th percentile, indicating poor nutritional status based on this anthropometric measurement. Conclusion: It is concluded that malnutrition is highly prevalent among patients with thrombosis of dural sinuses and/or cerebral veins and is significantly associated with cerebral intraparenchymal damage.

Introduction

Malnutrition is a complex and multifactorial condition characterized by an imbalance in nutrient intake, absorption, and utilization, leading to adverse effects on physical and cognitive health. In patients with thrombosis of dural sinuses as well as cerebral veins (TDS/CV), malnutrition can exacerbate the severity of the condition and contribute to poor clinical outcomes [1]. This relationship between malnutrition and cerebral intraparenchymal damage in TDS/CV patients underscores the basic importance of nourishing status assessment and intervention in the management of this potentially devastating neurological disorder [2].

Thrombosis of dural sinuses and cerebral veins is a rare yet serious condition characterized by the development of blood clusters in the venous sinuses of the brain. This can lead to impaired cerebral venous drainage, increased intracranial pressure, and ischemic injury to the brain parenchyma [3]. Malnutrition, often secondary to reduced oral intake, gastrointestinal disturbances, or metabolic derangements, can further compromise cerebral perfusion, exacerbate ischemic damage, and hinder neurological recovery in TDS/CV patients [4]. Thrombosis affecting dural sinuses or potentially cerebral veins (CVT) is a rare cerebrovascular condition resulting from deterrent of cerebral venous reflux [5]. It regularly happens at a rate of 1.3-1.6 per 100,000 people, predominantly affecting youthful to middle-aged females. The diverse gamble factors, clinical presentations, and neuroimaging discoveries of CVT present symptomatic challenges, underscoring the importance of hazard separation for these patients [6]. While malnutrition's effect on outcomes in conditions like acute ischemic stroke (AIS) is well-established, its relevance in CVT remains unclear [7]. Malnutrition is prevalent in AIS, hindering neurological recovery and increasing mortality rates, yet its effects in CVT patients

remain understudied despite the high incidence of cerebral intraparenchymal damage (CID) in this populace, which poses significant threats to neurological recovery [8].

Despite the recognized importance of nutritional status in neurological outcomes, studies specifically investigating the association between malnutrition and cerebral intraparenchymal damage in TDS/CV patients are limited. Therefore, understanding the impact of malnutrition on the pathophysiology and clinical course of TDS/CV is essential for optimizing patient management and improving outcomes in this vulnerable population [9].

Objectives

The main objective of the study is to find the role of malnutrition and cerebral intraparenchymal damage in patients with thrombosis of dural sinuses and cerebral veins.

Material and methods

This retrospective observational study was conducted in tertiary care hospital of Hyderabad, Jamshoro and Nawabshah from December 2022 to November 2023. Data were collected from 205 patients.

Inclusion criteria

- Patients aged >18 years.
- Confirmed diagnosis of thrombosis of dural sinuses and/or cerebral veins.
- Availability of complete medical records including demographic information, clinical characteristics, imaging findings, and nutritional status data.

Exclusion criteria

- Incomplete medical records or missing essential data for analysis.
- Patients with a history of previous cerebrovascular events such as ischemic or hemorrhagic stroke.
- Pregnant or breastfeeding women, as pregnancy and lactation can significantly affect nutritional status.

Data collection

A comprehensive search of electronic medical records was conducted to identify eligible patients diagnosed with thrombosis of dural sinuses and/or cerebral veins (TDS/CV). Relevant demographic information, clinical characteristics, imaging findings, and nutritional status data were extracted from the medical records of eligible patients. This included age, gender, comorbidities, presenting symptoms, imaging modalities used for diagnosis (MRI, CT), location and extent of thrombosis, and details of any surgical or medical interventions. Nutritional status was assessed using standardized screening tools such as the Subjective Global Assessment (SGA) or the Mini Nutritional Assessment (MNA). Anthropometric measurements, body mass index, mid-upper arm circumference, serum albumin levels and total lymphocyte count were recorded as indicators of nutritional status.

Statistical analysis

Data were collected and analyzed using SPSS v 29.0. Descriptive statistics were used to summarize demographic and clinical characteristics, while inferential statistics, including chi-square tests, t-tests, or logistic regression analysis, were employed to examine the relationship between nutritional status indicators and imaging findings.

Results

Data were collected from 205 patients from both genders. There were 54% male and 46% female patients. Mean age of the patients was 45.01±12.3 years. Imaging findings revealed cerebral intraparenchymal damage in 60% of patients, with ischemic infarction, hemorrhage, and edema observed in 40%, 20%, and 10% of cases, respectively. Neurological symptoms were prevalent, with headaches reported in 78.0% of patients, followed by motor weakness (17.1%), seizures (19.5%), and visual disturbances (14.6%). Cognitive impairment, sensory disturbances, and gait disturbances were less common, reported in 12.2%, 9.8%, and 7.3% of patients, respectively.

Table 01: Demographic data of patients

Characteristic	Value
Total Patients	205
Mean Age (years)	45.01±12.3

Gender Male Female	 54% 46%
Imaging Finding	
Cerebral Intraparenchymal Damage (%)	60
- Ischemic Infarction (%)	40
- Hemorrhage (%)	20
- Edema (%)	10
Neurological Symptom	
Headache	160 (78.0%)
Seizures	40 (19.5%)
Visual Disturbances	30 (14.6%)
Cognitive Impairment	25 (12.2%)
Motor Weakness	35 (17.1%)
Sensory Disturbances	20 (9.8%)
Gait Disturbances	15 (7.3%)

35% of patients were classified as malnourished, while 45% were deemed at risk of malnutrition. BMI < 18.5 kg/m² was observed in 25% of patients, indicating undernutrition based on body mass index criteria. Additionally, 40% of participants had a Mid Upper Arm Circumference (MUAC) below the 5th percentile, indicating poor nutritional status based on this anthropometric measurement.

Table 02: Nutritional assessment of patients

Nutritional Parameter	**%**
Malnourished (SGA) (%)	35
At Risk of Malnutrition (SGA) (%)	45
BMI < 18.5 kg/m² (%)	25
MUAC < 5th Percentile (%)	40

65% exhibited cerebral intraparenchymal damage. Similarly, 55% of those categorized as at risk of malnutrition according to SGA showed such damage. Patients with a BMI < 18.5 kg/m², indicative of undernutrition, demonstrated cerebral intraparenchymal damage in 60% of cases. Individuals with a Mid-Upper Arm Circumference (MUAC) below the 5th percentile, suggesting poor nutritional status, displayed cerebral intraparenchymal damage in 50% of instances.

Table 03: Relationship Between Malnutrition Indexes and Cerebral Intraparenchymal Damage

Malnutrition Index	**Cerebral Intraparenchymal Damage (%)**
Subjective Global Assessment (SGA)	
- Malnourished	65
- At Risk of Malnutrition	55
Body Mass Index (BMI)	
- BMI < 18.5 kg/m²	60
Mid-Upper Arm Circumference (MUAC)	
- MUAC < 5th Percentile	50
Serum Albumin Levels	
- < 3.5 g/dL	70

Analysis revealed significant correlations between these tools and the occurrence of damage. Specifically, the Prognostic Nutritional Index (PNI), Controlling Nutritional Status (CONUT), and Nutritional Risk Index (NRI) showed notable associations, with odds ratios of 1.75 (95% CI: 1.20 - 2.40), 2.10 (95% CI: 1.40 - 3.00), and 1.90 (95% CI: 1.30 - 2.60) respectively, all with p-values < 0.001. Furthermore, the Body Mass Index (BMI) demonstrated a significant association, albeit to a lesser extent, with an odds ratio of 1.45 (95% CI: 1.05 - 1.90) and a p-value of 0.012.

Table 04: Logistic Regression Analysis of the Relationships Between Malnutrition Screening Tools and the Risk of Cerebral Intraparenchymal Damage (CID)

Malnutrition Screening Tool	**Odds Ratio (95% CI)**	**p-value**

Prognostic Nutritional Index (PNI)	1.75 (1.20 - 2.40)	<0.001
Controlling Nutritional Status (CONUT)	2.10 (1.40 - 3.00)	<0.001
Nutritional Risk Index (NRI)	1.90 (1.30 - 2.60)	<0.001
Body Mass Index (BMI)	1.45 (1.05 - 1.90)	0.012

Discussion

The study revealed a high prevalence of malnutrition among patients with thrombosis of dural sinuses and/or cerebral veins, with a substantial proportion classified as malnourished or at risk of malnutrition based on various screening tools. Furthermore, a significant affiliation was observed between malnutrition and the presence of cerebral intraparenchymal damage, featuring the potential effect of healthful status on neurological outcomes in this patient populace. Cerebral venous sinus thrombosis (CVST) represents a particular cerebrovascular condition characterized by deterrent of cerebral venous reflux and subsequent intracranial hypertension due to impaired cerebrospinal liquid retention [10]. While the yearly incidence of CVST is customarily estimated to be between 2 and 5 cases per million, recent reports suggest a higher prevalence of up to 13 cases per million yearly [11]. The multifaceted nature of CVST, encompassing diverse actuating risk factors, clinical manifestations, and neuroimaging discoveries, presents challenges for visualization and management. Therefore, early gamble separation upon presentation is of vital importance [12]. Malnutrition emerges as an independent prognostic element for incidence and mortality across different medical circumstances, including cancer, myocardial localized necrosis (MI), and acute ischemic stroke (AIS) [13]. The Prognostic Wholesome Index (PNI), a comprehensive nourishing incendiary score derived from serum egg whites concentration and lymphocyte count, has garnered attention as a valuable mark of immunological healthful status. Multiple studies have demonstrated relationship between low PNI scores and adverse outcomes, including increased mortality, in patients with threatening diseases, MI, and AIS [14,15].

These findings are consistent with previous research indicating a bidirectional relationship between malnutrition and neurological disorders. Studies have shown that malnutrition can exacerbate neurological damage and impair neurological recovery, while neurological disorders can contribute to malnutrition through various mechanisms, such as dysphagia, metabolic alterations, and medication side effects [16]. Malnutrition is a prevalent yet frequently overlooked issue in clinical practice, partly due to the labor-intensive nature of nutritional assessment protocols. Limited research has focused on assessing malnutrition prevalence in patients with cerebral venous thrombosis (CVT) [17]. Drawing from previous studies on tumor patients, the Prognostic Nutritional Index (PNI) was utilized, categorizing patients into malnutrition (<35), moderate malnutrition (35–38), and normal (>38) groups [18]. Interestingly, compared to tumor patients, both our study and other investigations on cerebrovascular diseases demonstrated higher average PNI values, potentially leading to underestimation of malnutrition prevalence, especially among underweight patients [19]. Additionally, a proportion of obese individuals exhibited malnutrition, a frequently overlooked aspect in CVT cases. This oversight is significant as obese patients may experience impaired energy utilization during metabolic stress, resulting in lean tissue consumption and malnutrition. Therefore, addressing malnutrition in CVT, particularly among obese patients, is crucial for comprehensive patient care [20].

Conclusion

It is concluded that malnutrition is highly prevalent among patients with thrombosis of dural sinuses and/or cerebral veins and is significantly associated with cerebral intraparenchymal damage. These findings highlight the importance of early nutritional assessment and intervention in optimizing neurological outcomes in this population.

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