OriginalResearch

EVALUATING THE INCIDENCE OF THROMBOEMBOLIC DISORDERS DURING PREGNANCY AND PUERPERIUM WITH THEIR PRESENTATION, COMPLICATIONS, AND RISK FACTORS: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Introduction: Due to the pro-thrombotic state during pregnancy, cortical venous thrombosis, dural venous sinuses, and thrombosis of the cerebral veins afflict people more frequently throughout the puerperal phase. This study aims to assess the incidence, types of sinuses involved, symptoms and risk factors of thromboembolic disorder throughout pregnancy and the puerperal phase.**Methods:** This prospective observational study was conducted during the study period of 18 months (January 2020-June, 2021). This included 100confirmed cases (both clinical and radiological) of thromboembolic disorders in pregnancy and puerperal period who were admitted at Thanjavur medical college hospital, Tamil Nadu. Data was collected in the schedule, and responses were entered in Microsoft excel. The descriptive statistics such as frequency and percentages were calculated using Epi info free software available online. **Results:** In the current investigation, 100 cases of thrombosis were analysed. Most thromboembolic patients (56 cases) were between the ages of 26 and 35. Nearly more than one-third (29%) were in the post-natal period of gestation, almost half (51%) of them had a caesarean section as a mode of delivery, 63% were multiparous, 42% were in the BMI range of 25.1- 30 and majority (96%) had venous thromboembolism. Out of 70 cases of cortical venous thrombosis, the superior sagittal sinus was the most frequently affected (55.7%). We found hypertensive disorders (54%) and diabetes (12%) are the most important predisposing factor for thrombosis. The most common symptom is headache, contributing to 41.4%, and convulsions, contributing to 27%.
Conclusion: Thromboembolism is most common in post-natal women who have undergone caesarean section and multiparous. Obese people are more likely to develop thromboembolism than non-obese people.

Keywords: Thromboembolism,Deep Vein Thrombosis, Cortical Venous Thrombosis

Introduction

Thromboembolic disorders account for 0.5to 2.0 per 1000 pregnancies, which leads to 1.1 deaths per1,00,000 pregnancies. The risk of thromboembolism in pregnancy is four to five times higher than that of non-pregnant women(Parunov et al., 2015). Early recognition of signs and symptoms and prompt treatment reduce the morbidity and mortality due to thromboembolic disorders(Tarbox & Swaroop, 2013).

In 1856, Rudolf Virchow postulated the Virchow triad–venous stasis, hypercoagulability and endothelial changes(Kumar et al., 2010). Pregnancy itself predisposes the risk of thromboembolism due to a hypercoagulable state; the uterus compresses the leg vein – causing venous stasis and endothelial injury in case of preeclampsia(Dado et al., 2018). Around 70% of Deep vein thrombosis in antenatal patients occurs within less than 15 weeks of gestation during the antenatal period.Most deep vein thrombosis occurs in the iliofemoral vein, which is more prone to embolism and challenging to diagnose(Devis & Knuttinen, 2017).

Cortical venous thrombosis, dural venous sinuses and thrombosis of cerebral veins affect more commonly during the puerperal period due to the pro thrombotic state.The patient typically exhibits localised neurological impairments, papilledema, altered sensorium, headaches, and seizures(Alvis-Miranda et al., 2013). Cantu from Mexico reported that 59% of cortical venous thromboses are puerperal. International Study on Cerebral and Dural Sinus Thrombosis reported that 20% are obstetric cerebral venous thrombosis; Compared to Mexico, India showed the highest frequency of cases(Alvis-Miranda et al., 2013). (Cross et al., 1968) stated that "if the patient survives acute episode, recovery is rapid and complete". The clinical spectrum of cerebral sinus venous thrombosis is vast, where its mode of onset is highly variable, and it is regarded as a medical emergency(Nagaraja et al., 1999).

Pulmonary embolism is rare and affects 1 in 7000 pregnancies. Pulmonary embolism is fatal if not treated promptly(Bonnin et al., 2005).This study aims to assess the prevalence, demography, risk factors, clinical characteristics, diagnosis, and treatment of thromboembolic disorder throughout pregnancy and the puerperal phase, as well as to examine the results for both the mother and the perinatal outcomes.

The current study aimed to assess the prevalence, types of sinuses involved, symptoms and risk factors of thromboembolic disorder throughout pregnancy and the puerperal phase.

METHODS

This is a prospective observational study including 100confirmed cases (both clinical and radiological) of thromboembolic disorders in pregnancy and puerperal period who were admitted at Thanjavur medical college hospital, Tamil Nadu, during the study period of 18 months (January 2020-June, 2021) and followed up till their completion of treatment.

Exclusion criteria:All patients without a definitive diagnosis of thromboembolic disorders or without radiological evidence of Cortical Vein Thrombosis (CVT) or women who presented with complaints after six weeks' puerperium were excluded.

Study procedure:

All patients admitted during the study were analysed based on a performed proforma. Primary demographic data were recorded regarding the name, age, parity, number of live children, type of antenatal care, mode of delivery, and presence of predisposing factors. Results of the procedure concerning incidence, risk factors and complications associated with thromboembolic disorders were inferred. Among the radiologically confirmed cases, the following investigations were performed.

Cortical venous thrombosis- All patients underwent neuroimaging, including brain Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) with Magnetic Resonance Angiography (MRA) and Magnetic Resonance Venography (MRV) with clinically confirmed cases of cortical venous thrombosis

Deep vein thrombosis-Doppler ultrasound is done in a patient with Deep vein thrombosis.

A pulmonary Embolism-CT Pulmonary Angiogram was performed.

Mitral valve thrombosis-Echocardiography done.

Brachial Artery thrombosis-Doppler sonography

Cephalic vein thrombosis - Doppler sonography

Ethical considerations:

The prepared protocol was submitted to the Institutional Ethics Committee (IEC), and permission to carry out the study was obtained before the study was started. The pregnant mothers were interviewed in person, and various radiologic investigations and blood for coagulation profiles were drawn after obtaining informed written consent. The privacy and confidentiality of the mother were conserved

Statistical Analysis:

Data was collected in the schedule, and responses were entered in Microsoft excel. The descriptive statistics such as frequency and percentages were calculated using Epi info free software available online. A value less than or equal to 0.05 was inferred as statistical significance.

Results:

In the current investigation, 100 cases of thrombosis were analysed. Fifty-six individuals, or most thromboembolic patients, were between 26 and 35. The oldest is 45 years old, and the youngest is 16. The mean age was found to be 30.5. Among which majority of the thrombosis contributes to the puerperal group, post caesarean section 51%, post-natal 29% and post-abort-al 10%. Thromboembolism risk increases during multi para contributing to 63% (out of 100 cases). Most patients are overweight, contributing to 42%, and obese patients contribute 16%. , majority of the thrombosis is venous thrombosis 96 cases (Table: 1)

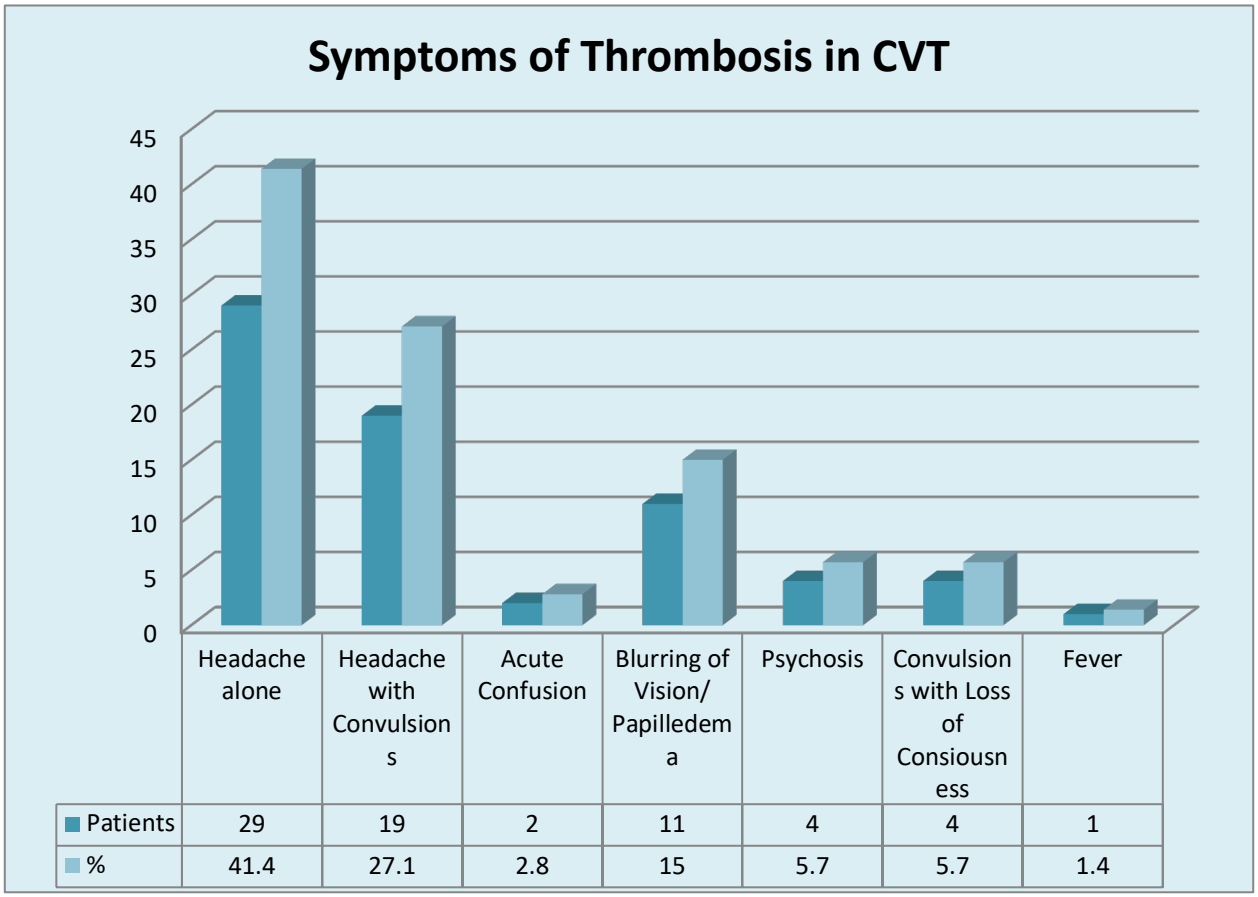
Table: 1 Distribution of study participants according to several variables (n=100)

		Patients(n=100)	Percentage (%)
Based on age (in years)	16-25	34	34
	26-35	56	56
	>35	10	10
Based on the period of gestation	Antenatal	10	10
	PostAbortal	10	10
	PostNatal	29	29
	PostCaesarean Section	51	51
Based on the mode of delivery	Normal vaginal delivery	26	32.5
	Assisted vaginal delivery	3	3.75
	Caesarean section	51	63.5
Based on Parity	Primi	37	37
	Multi	63	63
Based on BMI	<18.5	2	2
	18.6 - 25	40	40
	25.1 - 30	42	42
	> 30.1	16	16
Type of thrombosis	Arterial thrombosis	1	-
	Venous thrombosis	96	CORTICAL VENOUS THROMBOSIS-70
			DEEP VEIN THROMBOSIS-21
			MESENTERIC VEIN THROMBOSIS-1
			CEPHALIC VEIN THROMBOSIS-4
	Pulmonary embolism	1	-
	Mitral valve thrombosis	2	-

Table: 2. Types of sinus involved in Cortical Vein Thrombosis (CVT) (n=70)

S.No	Types of sinusinvolvedinCVT (n=70)	Patients	%
1	SuperiorSagittalSinus	39	55.7
2	SuperiorSagittalSinusandTransverseSinus	10	14.2
3	SigmoidSinus	6	8.6
4	TransverseSinus	7	10
5	StraightSinus	2	2.6
6	CerebralveinThrombus	6	8.6

Among 70 patients, the most common sinus involved was found to be Superior Sagittal Sinus (55.7%) followed by the combination of Superior Sagittal Sinus and Transverse Sinus, (14.2%).(Table:2)



The most frequent symptom in the current study, accounting for 41.4% of cases, is headache, convulsions contributing to 27%, blurring of vision contributing to 15%.(figure:1)

Figure: 1 Symptoms of thrombus in cortical vein thrombosis (n=70)

Table: 3. The available risk factors in the study,(n= 100)

RISK FACTORS	NO.	%
Hypertension(GHT/chronic HT)	54	54
Hypothyroid	8	8
Diabetes(GDM/DM)	12	12
Prolonged immobilisation	8	8
Dehydration	5	5
Heart disease	3	3
Antiphospholipid Antibody Syndrome (APLA)	3	3
COVID cases	2	2
Sepsis	3	3
Ventilator	2	2

In our study, we found hypertensive disorders (54%), diabetes (12%), Dehydration (5%), sepsis (3%), and ventilator (2%) are the most important predisposing factor for thrombosis. (table:3)

Discussion

In pregnant individuals compared to those who are not, thromboembolism is more prevalent and harder to diagnose. The main factor contributing to maternal deaths in developed countries is pulmonary embolism(Marik & Plante, 2008; Simpson et al., 2001). Many of these deaths result from delayed diagnosis, delayed or ineffective treatment, and insufficient thromboprophylaxis. Focusing on venous thrombosis during pregnancy, this study will provide an overview of its prevalence, types of sinuses involved, symptoms and risk factors of thromboembolic disorder throughout pregnancy and the puerperal phase.

In this study, 100 cases were studied, with the highest thromboembolic disorder being within the age group of 26 to 35 years. This is consistent with various studies. Pregnancy-related (antepartum and postpartum) thromboembolism occurred 59 times per 10,000 pregnancies. In contrast, the incidence rate of thromboembolism in women of reproductive age (20-49 years old) was 28 instances per 10,000 people per year(Coon WW.,1973). VTE incidence rates in the modern era (1987–2004) are thought to be significantly lower. The absolute risk of VTE outside of pregnancy (before the date of conception or after three months following delivery) was estimated by (Sultan A., 2015) in significant population-based cohort research to be 2 per 10,000 people per year (for the population of reproductive-aged females).

Most of the patients are overweight, contributing to 42%, with obese patients contributing to 16%. Likewise,(Finkelstein et al., 2012) proposed a positive association between increasing BMI and escalating risk of thromboembolism. (Borch et al., 2009) found that increasing BMI was related to an

increased incidence of recurrent thromboembolism. This showed that increased BMI increases the risk of thromboembolism.

In the present study, most of the thromboembolic disorder is mainly confined to the puerperal group consisting of post-C-section. The annual incidence of thromboembolism was five times higher among postpartum women who underwent lower caesarean section than pregnant women, and the incidence of deep venous thrombosis was three times higher than that of pulmonary embolism in postpartum women, according to (Heit et al., 2005). According to (Berg et al., 2003), 42% of women with lower limb extremity deep vein thrombosis went on to develop pulmonary thromboembolism.

In the present study, out of 70 patients with cortical vein thrombosis, most of the cortical vein thrombosis occurs in the post-natal period contributing to 21.4%, followed by post-cesarean section contributing to 61.4%. In a study by (Kumar S., 2004), 65 out of 85 cases (about 76%) of puerperal Cortical Vein Thrombosis were discovered. The present study of the cortical venous thrombosis (CVT) group is comparable (Kumar S., 2004).

In the current study, headache was the most prevalent symptom, affecting 41.4% of patients, comparable to the(Kumar S.,2004) study with 66%. Only 20% of cortical venous thrombosis (CVT) patients with pre-eclamptic toxaemia show prolonged diastolic pressure of >105mmHg before stroke occurs, according to a study by (James et al., 2005). Other trials, such as those by (Daif A., 1995),(Nagaraja et al., 1999), and (Plum, 1987), reported a very high (>50%) frequency of headaches. A link between gestational diabetes and thrombosis was also discovered by (James et al., 2005)and (Jacobsen et al., 2008) in two trials.

In the current study, seizures occurred in 27% of individuals, which is equivalent to (Schell & Rathe, 1988)'s study. The study's findings were found to be incongruent with those of **(**Kumar et al., 2004)(67%)(Schell & Rathe, 1988)(39.2%). The superior sagittal sinus is most frequently affected in the current study of the CVT group, accounting for 55.7% of cases, followed by the transverse sinus with 10%, and the cerebral vein with 8.6%, which is comparable to (Ameri & Bousser, 1992) (72%) and (Schell & Rathe, 1988)(72.2%). Similar to our study group, (Bansal et al., 1980)observed that postpartum CVT occurred 7–10 days after birth. The percentages of the superior sagittal sinus, transverse/sigmoid sinus, straight sinus, and internal cerebral vein were reported by (Daif A., 1995)**.**

According to (Brown et al., 2006), women with pre-eclampsia had a 60% higher risk of having an ischemic stroke than women without it**.** This current study is more comparable with (Brown et al., 2006), in which women with hypertensive disorders were 54%. All cases of DVT presented with the same symptoms of leg pain and swelling. In the present study, thromboembolism risk increases during multipara, contributing to 63% (out of 100 cases).

The study had a few limitations. Firstly, there needed to be more sample size obtained for the appropriate study design. The causal relationship is difficult to assess. Secondly, this was a single-

centred study; most participants were from rural areas.It will be easier to establish a link between the aetiology and disease prognosis through longitudinal studies that take the form of follow-up studies.

Conclusion

The postpartum period and pregnancy put women at higher risk for venous thromboembolism. Even though venous thromboembolism is the main factor in maternal mortality in developing countries, it is still a relatively uncommon occurrence. The majority of these incidents are deep vein thromboses that happen after childbirth. Multiple pregnancies are a significant risk factor. Women who underwent a caesarean section postpartum, obese, multiparous or have a history of hypertension disease should have their risk for venous thromboembolism thoroughly evaluated.

Conflicts of Interest

The author declares no conflicts of interest.

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