JOURNAL OF TECHNIQUES

Journal homepage: http://journal.mtu.edu.iq

RESEARCH ARTICLE - MEDICAL TECHNIQUES

Evaluation of Risk Factors of Venous Thromboembolism in Imam Sadiq Teaching Hospital at Babylon City

Intisar Mahdi Kadhim Almurshedi[1*], Amel Mustafa Kamil[1], Aqeel Abbas Noaman[2]

[1] College of Health & Medical Technology - Baghdad, Middle Technical University, Baghdad, Iraq

[2] Technical Institute / Baquba, Middle Technical University, Baghdad, Iraq

[*] Corresponding author E-mail: eac0017@mtu.edu.iq

Article Info.

Article history:

Received
01 July 2022

Accepted
23 July 2022

Publishing
15 November 2022

Abstract

Venous thromboembolism (VTE), a term referring to blood clots in the veins, is an underdiagnosed and dangerous, yet avoidable, medical illness that can result in disability and mortality. When a blood clot develops in a deep vein, commonly in the lower leg, thigh, or pelvis, it is referred to as a deep vein thrombosis (DVT). To evaluate the risk factors of VTE between cases and controls in the hospital Imam Sadiq Teaching in Babylon City and to predict variables that contribute to the risk factors of VTE among the studied samples. The study was conducted in a hospital, Imam Sadiq Teaching in Babylon, Iraq, and was designed as a case control. There were 165 participants (55 cases and 110 controls). Data was collected during a four-month period. The findings show that there are no significant sociodemographic risk factors for VTE, with the most significant being obstructive sleep apnea syndrome (p. value < 0.05) among patients. The frequency of exercise in patients with VTE and the control group was 20.0%, 36.4% respectively, at a significant level (P. value < 0.05). There was no significant association between risk factors for females and VTE (P. value > 0.05) except for used contraceptive pills and a history of a cesarean operation. There was no significant link between medical history and the outcome of this investigation (hypertension, diabetes, heart disease, and lung diseases) ... except kidney disease was likely at a higher risk of VTE than participants who had no kidney disease. Although there is no significant relationship between sociodemographic and VTE, the study found that there was a very high correlation between the risk of obstructive sleep apnea syndrome, caesarean sections, oral contraceptives, and renal disease with VTE.

Publisher : Middle Technical University

Keywords: Venous thromboembolism; Deep venous thrombosis; Pulmonary embolism; Obstructive sleep apnea syndrome; Risk factors.

1. Introduction

Venous thromboembolism (VTE) is a major cause of morbidity and mortality in trauma patients, and pulmonary embolism (P.E) represents one of the most frequent causes of mortality in trauma patients who survive the first 24 hours of hospitalization [1]. A deep-vein thrombosis (DVT) is a blood clot that develops in the deep veins of the body, primarily in the legs but sometimes in the arms, abdominal, and cerebral veins. DVT is a frequent and potentially fatal condition. If the popliteal vein or other central veins were involved, DVTs in the legs and pelvis were classed as proximal, and if just the calf veins were involved, they were defined as distal [2, 3]. DVT most commonly affects the axillary and/or subclavian veins in the upper extremities in people with cancer and/or indwelling venous catheters [2]. In the study, they found that hyper coagulopathy, stasis, and damage to the vascular endothelium all contribute to the thrombosis of blood vessels and these three variables make up Virchow's Triad [4]. Every year, between 300,000 and 600,000 people in the United States are thought to be affected by venous thromboembolism (VTE), which can manifest as deep vein thrombosis, pulmonary embolism, or both. This condition is serious and can be fatal. It is a condition that may affect people of all races and ethnicities, as well as people of various ages and genders. As many of the identified risk factors for advanced age, immobility, surgery, and obesity increase in society, VTE has become a serious and rising public health problem [5].

1.1. Aim of the study

To evaluate the risk factors of VTE between cases and controls in the hospital Imam Sadiq Teaching in Babylon City and to predict variables that contributes to the risk factors of VTE among the studied samples.

2. Patients and Methods

The study was designed as a case control and has been conducted in the Imam Sadiq teaching hospital in Babylon City. Data was collected for four months during period between the 1st of December 2021 and the 1st of April 2022. The sample for the study consisted of 165 people (55

Nomenclature			
VTE	Venous thromboembolism	OR	Odd ratio
P.E	pulmonary embolism	B	Beta
DVT	Deep-vein thrombosis	OSAS	Obstructive sleep apnea syndrome
S.D	Standard deviation	DMPA	Depot Medroxyprogesterone Acetate
X^2	Chi-Square	ESRD	End stage renal disease

cases and 110 controls), including all the patients who were diagnosed with VTE by a specialist using convenient sampling (a nonrandom sampling approach). The control number was double than cases 2:1. They matched all age and sex for both cases and control. They used the following a formula to determine the minimal size of a sample [29].

$$n=p*(1-p)*z^2/d^2$$

n: minimal sample size
P: proportion of Prevalence of DVT in the population was 2.7%, according to a previous study done by (Cook et al., 2005).
Z: confidence level (z = 1.96 at 95%)
D: This is the acceptable margin of error (0.05^2)
n= *(1-2.7%) *$1.96^2/0.05^2$
n = 40 cases are the least sample size necessary to carried out this study. But the actual number of cases in this study was 55.

3. Statistical Analysis

The data for each questionnaire was encoded and entered into an excel sheet before being transferred to the Statistical Packages for Social Sciences (SPSS)-26 Version. Extract data in the form of statistical tables consisting of frequencies, percentages, means, standard deviations, and ranges (minimum and maximum values). The significance of the difference between different percentages was determined using the Pearson chi-square test (X^2-test) (qualitative data). Statistical significance was taken into account where the P-value was less than or equal to 0.05. The risk variables related to VTE.

4. Results

The current study enrolled 55 patients with VTE and 110 healthy participants. The demographic characteristics of patients and control subjects are shown in Table 1. The mean age of patients and control participants was 54.67±17.36 and 54.58±19.19 years, respectively. The results show no significant difference (p. value = 1.000) between these two groups regarding mean age. The table shows that the age group 61-70 years old has the higher percentage of patients (32.7%). Regarding gender, it sets a distinct female preponderance of 31 (56.4%) versus male 24 (43.6%) at the level of no significant (P. value = 1.000). Whereas the same table shows no statistical differences regarding marital status among married, single, widowed, and divorced (65.5%, 7.3%, 25.5%, and 1.8%), respectively. While there were no significant differences regarding patients' residences, 31 (56.4%) were from urban areas and 24 (43.6%) from rural areas.
Table 2 relates to sleep status and exercise of the study groups and demonstrates that most patients28 (50.9%) significantly report they usually have obstructive sleep apnea syndrome compared to their control subjects. Regarding exercise, table 2 shows that 44 (80.0%) of patients with VTE significantly do not practice exercise. As compared to control subjects, 40 (36.4%) reported practice exercise. 6 (54.5%) of patients report they were walking exercise, and 5 (45.5%) were sports club games. Regarding the number of hours of exercise per day, the study found that the highest percentage 4 (36.4%) of patients exercised for one or two hours per day. The mean ± SD of hours of practice exercise for patients was 1.91±0.83 hours. While the mean ± SD of hours of practice exercise for healthy participants was 1.80±0.72 hours.
Table 3 explains the distribution and Univariate Logistic regression analysis to identify risk factors associated with VTE. Of the 31 (56.4%) female patients and 62 (56.2%) of those in the control group, the results found that all (100.0%, 96.5%) female patients and the control group had no exposure to VTE during pregnancy, respectively. Whereas the percentage has a history of 3 or more pregnancies, the study reveals 20 (71.4%) for female patients and 35 (61.4%) for the control group. The highest percentage of 64.3% of female patients had been used contraceptive pills, and 91.2% of healthy women had not taken contraceptive pills. A high percentage (57.1% and 94.7%) of female's patients and the control group, respectively, had never had a cesarean section. There was no significant association between risk factors for females and (P. value >0.05), except for used contraceptive pills and a history of a cesarean operation. The results of this study indicate that female participants who did not take contraceptive pills were likely at a lower risk of VTE than those who took contraceptive pills (B=-2.930-; P. value< 0.001; OR= 0. 053;95% C.I (0.016-0.177).Women who had never had a cesarean section were likely to be at lower risk of VTE than those who had (B= -2.519-; P. value=0.001; OR= 0.081; 95% C.I =(0.021-0.316).
Table 4 explains the distribution of patients with VTE and control subjects according to medical history. There is no significant association between the distribution of patients with VTE and the control group according to medical history (P. value >0.05), except kidney diseases.

Table 1 The demographic characteristics of venous thromboembolism cases and control subjects

Sociodemographic characteristic			Subjects		X^2	P. value
			Control	Patients with VTE		
Age groups per years	≤20 y	No.	6	3	0.205	1.000
		%	5.5%	5.5%		
	21-30y	No.	14	7		
		%	12.7%	12.7%		
	31-40y	No.	8	4		
		%	7.3%	7.3%		
	41-50y	No.	12	7		
		%	10.9%	12.7%		

	51-60y	No.	14	6		
		%	12.7%	10.9%		
	61-70y	No.	36	18		
		%	32.7%	32.7%		
	>70y	No.	20	10		
		%	18.2%	18.2%		
	Mean± SD (Range)		54.67±17.36 (17-84)	54.58±19.19 (16-85)	t. test=-0.028	0.997
Gender	Male	No.	48	24		
		%	43.6%	43.6%		
	Female	No.	62	31	0.000	1.000
		%	56.4%	56.4%		
Marital status	Married	No.	75	36		
		%	68.2%	65.5%		
	Single	No.	11	4		
		%	10.0%	7.3%		
	Widowed	No.	21	14	1.166[a]	0.761
		%	19.1%	25.5%		
	Divorced	No.	3	1		
		%	2.7%	1.8%		
Residence	Urban	No.	44	24		
		%	40.0%	43.6%	0.200[a]	0.200[a]
	Rural	No.	66	31		
		%	60.0%	56.4%		

Table 2 The distribution of cases with thromboembolism and control subjects based on their sleep status and exercise

Lifestyle related risk factors		Subjects: Control N (%)	Subjects: Patients with VTE N (%)	X^2	P. value
Obstructive sleep apnea syndrome	Yes	13 (11.8%)	28(50.9%)	30.004[a]	<0.001*
	No	97 (88.2%)	27 (49.1%)		
Do you practice exercise	Yes	40 (36.4%)	11 (20.0%)	4.598[a]	0.032*
	No	70 (63.6%)	44 (80.0%)		
Type of exercise	Sports club	16 (40.0%)	5 (45.5%)	0.613[a]	0.736
	Football	2 (5.0%)	0 (0.0%)		
	Walk	22 (55.0%)	6 (54.5%)		
How many hours a day you exercise	One hour	15 (37.5%)	4 (36.4%)	0.572[a]	0.751
	Two hours	18 (45.0%)	4 (36.4%)		
	Three hours	7 (17.5%)	3 (27.3%)		
	Mean± SD (Range)	1.80±0.72 (1-3)	1.91±0.83 (1-3)		

Table 3 The distribution and Univariate Logistic Regression Analysis to identify risk factors (women) associated with venous thromboembolism

For women			Subjects: Control	Subjects: Patients with VTE	*B*	P. value	OR (95% C.I)
Have you been exposed to DVT during pregnancy	Yes	No.	2	0			
		%	3.5%	0.0%	-	0.999 (NS)	-
	No	No.	55	28			
		%	96.5%	100.0%			
History of 3 or more pregnancies	Yes	No.	35	20			
		%	61.4%	71.4%	-	0.365 (NS)	-
	No	No.	22	8			
		%	38.6%	28.6%			
Taking contraceptive pills	Yes	No.	5	18			
		%	8.8%	64.3%	Reference		
	No	No.	52	10	-2.930-	<0.001	0.053 (0.016-0.177)
		%	91.2%	35.7%			
Have you ever had a cesarean operation?	Yes	No.	3	12			
		%	5.3%	42.9%	Reference		
	No	No.	54	16	-2.519-	<0.001	0.081 (0.021-0.316)
		%	94.7%	57.1%			

Table 4 The distribution of patients with venous thromboembolism and control subjects according to medical history

Medical history			Subjects		X^2	P. value
			Control	Patients with VTE		
Kidney diseases	No	No.	98	38	10.124[a]	0.001*
		%	89.1%	69.1%		
	Yes	No.	12	17		
		%	10.9%	30.9%		
Heart diseases	No	No.	81	42	0.144[a]	0.705
		%	73.6%	76.4%		
	Yes	No.	29	13		
		%	26.4%	23.6%		
Lung diseases	No	No.	94	43	1.376[a]	0.241
		%	85.5%	78.2%		
	Yes	No.	16	12		
		%	14.5%	21.8%		
Stroke	No	No.	95	46	0.219[a]	0.639
		%	86.4%	83.6%		
	Yes	No.	15	9		
		%	13.6%	16.4%		
Hypertension	No	No.	57	28	0.012[a]	0.912
		%	51.8%	50.9%		
	Yes	No.	53	27		
		%	48.2%	49.1%		
Diabetes mellitus type 2	No		82	35	2.115[a]	0.146
		No.				
		%	74.5%	63.6%		
		No.	28	20		
		%	25.5%	36.4%		

5. Discussion

In the current study, the mean age of patients and control participants was54.67±17.36 and 54.58±19.19 years, respectively. These results agreed with [6], who found that patients' mean age was 54.8±19.8 years. In this study, the higher percentage 36(32.7%) of control groups was aged 61-70 years, Patients had the higher percentage18 (32.7%) of their ages between 61-70 years, and the majority were patients. These results correspond with the study findings done by [7], who revealed that the higher percentage, 37.6%, of their ages between 61-71 years, were for the control group. Also, he reported the higher percentage (30.6%), of patients whose ages were between 40-49 years. Concerning obstructive sleep apnea syndrome, the study shows that most patients (50.9%) significantly report they usually have obstructive sleep apnea syndrome compared to control subjects. This result is in agreement with the previous studies [8 - 10], which discovered that considerably higher rates of obstructive sleep apnea syndrome have been reported in more clinical studies than control groups among VTE patients. Participants who did not have obstructive sleep apnea syndrome had a decreased risk of VTE compared to those who had. (B=-2.046-; P. value< 0.001; OR=0.129; 95% C.I=0.059-0.283).These results are consistent with the study findings [11], which revealed that severe obstructive sleep apnea syndrome can be a significant risk factor for VTE. Also, these results agree with [12], in which Participants with nocturnal hypoxemia were at a greater risk of VTE than those who did not have nocturnal hypoxemia (HR, 1.48; 95% C.I, 1.16-1.69). According to [13], the most common kind of sleep breathing problem is called obstructive sleep apnea syndrome (OSAS), which is characterized by recurrent partial or complete collapses of the upper airways, repeatedly throughout sleep. In the current study the frequency of exercise in patients with VTE and the control group was (20.0%, and 36.4%) respectively, at a significant level (P<0.05). These results are consistent with [14], who discovered that the frequency of exercise in patients with VTE and the control group was (5.7% and 13.7%) respectively, at a significant level (P < 0.001). Regarding exercise, in terms of activity, the findings revealed that people who do not exercise are more likely to get VTE than those who do, (B=0.827; P. value=.035; OR=2.286; 95% C.I =1.062-4.919).These results agreed with the study findings done by [15], which reported the exercises were protective factors for VTE in lower extremity fractures. Several studies have found that vigorous ankle exercises increase femoral vein blood flow, resulting in a lower risk of VTE in the rehabilitation group [16]. In the present study there was no significant association between pregnancy and VTE (P-value > 0.05). This result disagreed with the previous study findings conducted by [17], which found that during pregnancy the risk of VTE is increased five-fold. The plausible explanation for this difference may be because of several reasons. The most important of which may be that VTE in pregnancy can be difficult to identify, since non-thrombotic causes of leg edema, dyspnea, and chest discomfort are widespread. Additionally, because D-dimer concentrations are biologically elevated during pregnancy and rise with gestational age [18], they are not diagnostic tests. However, the level of suspicion should be high given the potential repercussions. Aim investigations are required to confirm a VTE and determine the extent of the thrombus, since clinical diagnoses of VTE are insufficient. Compression ultrasound examination is a quick, non-invasive, and widely used diagnostic technique with a 100% accuracy rate that is frequently used in symptomatic patients [19]. The results show that female participants who did not take contraceptive pills had a reduced risk of VTE than those who did (B = -2.930-; P. value=0.001; OR=0.053; 95% C.I = 0.021-0.177). These results agree with previous studies that have been published on the increased risk of thrombosis related to contraceptives, showing a 2-6 times greater risk of VTE associated with current use [20-22]. In a population-based case–control study of factors increasing the risk of venous thrombosis, injectable DMPA was associated with a statistically significant 3.6-fold (95% CI: 1.8–7.1-fold) higher risk of venous thrombosis when compared to those who did not use hormonal contraceptives, though the sample size was small (20 cases and 15 controls) [21]. The use of contraceptives, variations in the amounts of coagulation factors and anticoagulant proteins, such as protein S and tissue factor pathway inhibitor, as well as fibrinolytic parameters can all be linked to the scientific rationale for

this compatibility. [24]. this possibly thrombophilia disease varies depending on the CHC and the amount of estrogen and progestogen [25]. While women who had never had a cesarean section were likely to be at a lower risk of VTE than those who had (B= -2519-; P. value=0.001; OR=0.081; 95% C.I =0.021-0.316). These results agree with the study findings done by [23], which found that VTE presents a significant risk for women requiring Caesarean section as well as Another study by [26], reported that 1067/5364 (20%) of the births had caesarean sections, five of those women (0.47%) developed symptomatic pulmonary embolism, and all of these women had additional risk factors for VTE. Cesarean delivery increases the risk of VTE because it involves pelvic surgery that may last > 30 minutes, adding to the prothrombotic effects of delivery, pregnancy weight gain, and other risk factors [27]. The findings of the existing, there was no significant link between medical history of hypertension, diabetes, heart disease, and lung diseases and VTE (P. value >0.05). Which greed with the previous study findings done by [28] who found that there was no significant link between medical history (hypertension, diabetes, heart disease, and lung diseases) and VTE (P. value > 0.05). The current study found that participants who have kidney disease were likely at a higher risk of VTE than participants who have not kidney disease P. value <0.05, these results are consistent with the study findings done by [29]. They observed that ESRD patients with three or more comorbidities were at an increased risk of VTE (HR 1.45; 95% C.I 1.03–2.03; P=0.03). Another study found that those with end-stage renal illness have a 2.3-fold higher risk of VTE than the general population [30, 31] which found that multivariate analysis showed chronic renal insufficiency (OR, 3.37; 95% C.I, 1.57 to 7.28).

6. Conclusions

Although there is no significant relationship between sociodemographic and VTE, but there was a very high correlation between the risk of obstructive sleep apnea syndrome and VTE. The risk of venous thromboembolism is increased in women who have had caesarean sections or who take oral contraceptives.

6. Recommendations

The study recommends measures to reduce oral contraceptives for women, which may help reduce the incidence of VTE. Clinical diagnosis of VTE is inadequate. Tests are needed to confirm the VTE and identify the size of the thrombus. The focus on the prevalence of VTE among non-communicable diseases is announced annually by the Iraqi Ministry of Health.

References

[1] Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, Colwell CW:(2008) Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines.

[2] Barnes, G. D., Froehlich, J. B., Kanthi, Y., & Wakefield, T. W. (2014). Venous thromboembolism: Diagnosis, treatment and the prevention of long-term complications. Reviews in Vascular Medicine, 2(4), 136–142.

[3] Brownson, K. E., Brahmandam, A., Huynh, N., Reynolds, J., Fares, W. H., Lee, A. I., Dardik, A., & Chaar, C. I. O. (2017). Characteristics of provoked deep venous thrombosis in a tertiary care center. Journal of Vascular Surgery: Venous and Lymphatic Disorders, 5(4), 477–484.

[4] Byrnes, J. R., & Wolberg, A. S. (2017). New findings on venous thrombogenesis. Hämostaseologie, 37(01), 25–35.

[5] Beckman, M. G., Hooper, W. C., Critchley, S. E., & Ortel, T. L. (2010). Venous thromboembolism: a public health concern. American Journal of Preventive Medicine, 38(4), S495–S501.

[6] Elkhadir, A., Wazzan, M., Abduljabbar, A., Badwi, N. M., Hendi, F. M., Al-Shomrani, K. M., & Al-Malawi, A. A. (2018). Research Article Prevalence of Deep Venous Thrombosis (DVT) in Jeddah. Diabetes, 260, 16–57.

[7] Bokshan, S. L., DeFroda, S. F., Panarello, N. M., & Owens, B. D. (2018). Risk factors for deep vein thrombosis or pulmonary embolus following anterior cruciate ligament reconstruction. Orthopaedic Journal of Sports Medicine, 6(6), 2325967118781328.

[8] Mraovic, B., Hipszer, B. R., Epstein, R. H., Pequignot, E. C., Parvizi, J., & Joseph, J. I. (2010). Preadmission hyperglycemia is an independent risk factor for in-hospital symptomatic pulmonary embolism after major orthopedic surgery. The Journal of Arthroplasty, 25(1), 64–70.

[9] Epstein, M. D., Segal, L. N., Ibrahim, S. M., Friedman, N., & Bustami, R. (2010). Snoring and the risk of obstructive sleep apnea in patients with pulmonary embolism. Sleep, 33(8), 1069–1074.

[10] Alonso-Fernández, A., de la Peña, M., Romero, D., Piérola, J., Carrera, M., Barceló, A., Soriano, J. B., Suquia, A. G., Fernández-Capitán, C., & Lorenzo, A. (2013). Association between obstructive sleep apnea and pulmonary embolism. Mayo Clinic Proceedings, 88(6), 579–587.

[11] Bahar, Y., Annakkaya, A. N., Sen, C., Oktay, M., Aytekin, F., & Balbay, O. (2020). Assessment of the frequency of deep venous thromboembolism in obstructive sleep apnea syndrome. The Aging Male, 23(5), 1016–1021.

[12] Genuardi, M. V, Rathore, A., Ogilvie, R. P., DeSensi, R. S., Borker, P. V, Magnani, J. W., & Patel, S. R. (2021). Incidence of venous thromboembolism in patients with obstructive sleep apnea: a cohort study. Chest, 161(4), 1073–1082.

[13] American Academy of Sleep Medicine. (1999). The report of an American Academy of Sleep Medicine task force: sleep-related breathing disorders in adults; recommendations for syndrome definition and measurement techniques in clinical research. Sleep, 22, 667–689.

[14] Ozen, G., Pedro, S., Schumacher, R., Simon, T., & Michaud, K. (2020). Risk of Subsequent Atherosclerotic Cardiovascular Disease After the First Unprovoked Venous Thromboembolism in Patients with Rheumatoid Arthritis. Diabetes, 8(17.8), 0–1.

[15] Li, Q., Chen, X., Wang, Y., & Li, L. (2018). Analysis of the occurrence of deep venous thrombosis in lower extremity fractures: A clinical study. Pakistan Journal of Medical Sciences, 34(4), 828.

[16] Tanaka, K., Kamada, H., Shimizu, Y., Aikawa, S., Nishino, T., Ochiai, N., Sakane, M., & Yamazaki, M. (2016). The use of a novel in-bed active Leg Exercise Apparatus (LEX) for increasing venous blood flow. Journal of Rural Medicine, 11(1), 11–16.

[17] Group, E. C. W., Eichinger, S., Evers, J. L. H., Glasier, A., La Vecchia, C., Martinelli, I., Skouby, S., Somigliana, E., Baird, D. T., & Benagiano, G. (2013). Venous thromboembolism in women: a specific reproductive health risk. Human Reproduction Update, 19(5), 471–482.

[18] Jeremiah, Z. A., Adias, T. C., Opiah, M., George, S. P., Mgbere, O., & Essien, E. J. (2012). Elevation in D-dimer concentrations is positively correlated with gestation in normal uncomplicated pregnancy. International Journal of Women's Health, 4, 437.
[19] Goodacre, S., Sampson, F., Thomas, S., van Beek, E., & Sutton, A. (2005). Systematic review and meta-analysis of the diagnostic accuracy of ultrasonography for deep vein thrombosis. BMC Medical Imaging, 5(1), 1–13.
[20] Van Hylckama Vlieg, A, Helmerhorst, F. M., Vandenbroucke, J. P., Doggen, C. J. M., & Rosendaal, F. R. (2009). The venous thrombotic risk of oral contraceptives, effects of oestrogen dose and progestogen type: results of the MEGA case-control study. Bmj, 339.
[21] Van Hylckama Vlieg, Astrid, Helmerhorst, F. M., & Rosendaal, F. R. (2010). The risk of deep venous thrombosis associated with injectable depot–medroxyprogesterone acetate contraceptives or a levonorgestrel intrauterine device. Arteriosclerosis, Thrombosis, and Vascular Biology, 30(11), 2297–2300.
[22] Lidegaard, Ø., Løkkegaard, E., Svendsen, A. L., & Agger, C. (2009). Hormonal contraception and risk of venous thromboembolism: national follow-up study. Bmj, 339.
[23] Meneilly, Z., & McCutcheon, K. (2013). Deep vein thrombosis and Caesarean section. Journal of Perioperative Practice, 23(1–2), 17–21.
[24] Van Hylckama Vlieg, A, & Middeldorp, S. (2011). Hormone therapies and venous thromboembolism: where are we now? Journal of Thrombosis and Haemostasis, 9(2), 257–266.
[25] Group, E. C. W., Eichinger, S., Evers, J. L. H., Glasier, A., La Vecchia, C., Martinelli, I., Skouby, S., Somigliana, E., Baird, D. T., & Benagiano, G. (2013). Venous thromboembolism in women: a specific reproductive health risk. Human Reproduction Update, 19(5), 471–482.
[26] Jacobsen, A. F., Drolsum, A., Klow, N. E., Dahl, G. F., Qvigstad, E., & Sandset, P. M. (2004). Deep vein thrombosis after elective cesarean section. Thrombosis Research, 113(5), 283–288.
[27] Cruz, M., Fernández-Alonso, A. M., Rodríguez, I., Garrigosa, L., Caño, A., Carretero, P., Vizcaíno, A., & Gonzalez-Ramirez, A. R. (2011). Postcesarean thromboprophylaxis with two different regimens of bemiparin. Obstetrics and Gynecology International, 2011.
[28] Yu, Y., Tu, J., Lei, B., Shu, H., Zou, X., Li, R., Huang, C., Qu, Y., & Shang, Y. (2020). Incidence and risk factors of deep vein thrombosis in hospitalized COVID-19 patients. Clinical and Applied Thrombosis/Hemostasis, 26, 1076029620953217.
[29] Lu, H.-Y., & Liao, K.-M. (2018). Increased risk of deep vein thrombosis in end-stage renal disease patients. BMC Nephrology, 19(1), 1–9.
[30] Wattanakit, K., & Cushman, M. (2009). Chronic kidney disease and venous thromboembolism: epidemiology and mechanisms. Current Opinion in Pulmonary Medicine, 15(5), 408.
[31] Niu, S., Li, J., Zhao, Y., Ding, D., Jiang, G., & Song, Z. (2021). Preoperative deep venous thrombosis (DVT) after femoral neck fracture in the elderly, the incidence, timing, location and related risk factors. BMC Musculoskeletal Disorders, 22(1), 1–9.