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Original Research Article

Prevalence of Deep Vein Thrombosis Following Mastectomy in Women Undergoing Chemotherapy

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ABSTRACT

The prevalence of deep vein thrombosis (DVT), as a fatal complication of cancer, is affected by several variables. Chemotherapy is an exacerbating factor of DVT in cancer patients. Given the uncertain effect of chemotherapy after mastectomy in women, this study aimed to determine the prevalence of DVT following mastectomy in women undergoing chemotherapy. This cross-sectional descriptive study was conducted in hospitals, affiliated with Tabriz University of Medical Sciences, on 230 women under chemotherapy, following mastectomy. In this study, DVT examinations were performed using an instrument designed in compliance with the research objectives. People at high risk, based on this instrument, received a Doppler ultrasound. Finally, the collected data were analyzed using descriptive and inferential tests. Based on the results, 72 patients were at high risk of DVT, which reduced to 37 confirmed cases after Doppler ultrasound. The results indicate that an increase in chemotherapy sessions was effective in increasing the incidence of DVT. The results of the present study suggested that one out of ten women undergoing chemotherapy, following mastectomy, developed DVT.

Keywords: Breast, Chemotherapy, Deep vein thrombosis, Cancer

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Introduction

Breast cancer is the most common cancer and the second leading cause of death in women [1]. It is estimated that the incidence rate of breast cancer will double by 2050 [2]. Therefore, the World Health Organization (WHO) has recommended taking preventive and screening measures for women in all countries [3]. Although the prevalence of breast cancer varies in different societies, it has been proved that it is probably correlated with aging [4]. In other words, the risk of breast cancer increases with aging. A meta-analysis study reported that the risk of breast cancer in women above 40 is twice those below 40 [5]. Following the breast cancer tsunami in the recent decade, substantial progress has been made in the treatment of breast cancer [6]. Therapeutical techniques, such as mastectomy, lumpectomy, radiotherapy, chemotherapy, and hormone therapy, are the major breast cancer treatments. Depending on the type of involvement and the degree of the disease, a person may receive one of these treatments or a hybrid therapy [7, 8]. Chemotherapy is the most common breast cancer treatment and a major component in both hybrid and non-hybrid therapies. Chemotherapy treats breast cancer by weakening and killing the cancer cells. This technique increases life expectancy, reduces treatment costs, reduces hospital stays, and increases survival rate [9, 10]. In addition to the benefits of chemotherapy, the complications of this treatment are so great that in some cases prevent the continuation of the treatment process, making doctors temporarily cancel the chemotherapy program. Among these complications are systemic infections, severe weakness (cachexia), severe hemoglobin level drop, and DVT [11, 12]. Although DVT, following breast cancer, is not a common complication, it can lead to very unpleasant outcomes, such as death, and thus awareness about it should be raised [13]. Kang et al. (2016) reported that the prevalence of DVT in patients on a central venous catheter (CVC) for chemotherapy was 23% and in patients on a peripheral venous catheter (PVC) for chemotherapy was 7%. They reported that several factors are involved in DVT, including aging, disease (e.g. cancer), drug side effects, sedentary lifestyle, and weakness due to chemotherapy [14]. Since there is no study in Iran on the prevalence of DVT in Iranian women with breast cancer undergoing chemotherapy, DVT, following cancer, is a fatal complication, and its prevalence is affected by several variables. Chemotherapy is an exacerbating factor for this complication in cancer patients. Given the uncertain effect of chemotherapy after mastectomy in women, this study aimed to determine the prevalence of DVT following mastectomy in women undergoing chemotherapy.

Methodology

This cross-sectional descriptive study was conducted in chemotherapy clinics of Tabriz on 230 eligible women in 2019. Based on the main objective of the paper (prevalence of DVT), quantitative nature of the main research variable (with/without DVT), 7% of prevalence reported by Kang et al. (2016) [14], confidence interval of 95%, and the error rate of 0.05, the sample size was set at 150 patients. Considering probable sample loss of 10%, the final sample size was set at 165. After obtaining approval from the Ethics Committee (IR.TBZMED.REC.1397.598) of Ghazi Tabatabai and Shahid Madani Hospitals (equipped with chemotherapy facilities), affiliated to Tabriz University of Medical Sciences, the researcher attended the research sites. After obtaining permission from the authorities of their chemotherapy clinics, research samples were selected based on the inclusion (minimum age of 40 years, at least three chemotherapy sessions, willingness to participate in research plan, and breast cancer) and exclusion (previous history of DVT, family history of DVT, having cancer except for breast cancer, taking anticoagulants, history of heart attack and stroke, history of diseases that require absolute rest at home, history of trauma in the last six months, history of surgery because of breast cancer, and history of radiotherapy following breast cancer) criteria. Samples were selected using done using the census sampling method, in compliance with the research objective. The number of selected samples from each hospital was based on the number of their visitors (200 from Ghazi Tabatabai Hospital and 130 from Shahid Madani Hospital). The inclusion of the patients was on basis of their visit date to the clinics. It was tried to select patients on similar drug regimes to achieve a more accurate assessment of the main research variable. The research instrument has two parts. The first part includes demographic data (age, BMI, chemotherapy sessions, job, tobacco use, alcohol use, and regular body exercise). The second part dealt with DVT diagnosis (both organs). This instrument, developed by Patrawalla et al. (2015) to assess DVT (15), is comprised of 19 items (each is scored 1), 6 items (each is scored 2), 8 items (each is scored 3), and 5 items (each is scored 6). The reliability (0.9) and validity (Cronbach's alpha = 0.78) of this instrument have been approved in an Iranian study [16]. The score range is between 0 and 85, indicative of low risk (score of lower than 10), moderate risk (score of between 10 and 40), and high risk (score of higher than 40). In this study, patients at higher risk of DVT were also examined by ultrasound to confirm DVT. The researchers were committed to all ethical considerations in the field of medical research, including the privacy of patients, free-of-charge examinations, clear and simple explanation of research goals, informed

written consent, and voluntary participation, on top. The collected data were analyzed using SPSS21 and their mean, standard deviation, and percentage were obtained. The employed statistical tests were regression and Spearman correlation to examine the relationship of the qualitative variable (DVT) at the significance level of lower than 0.05.

Results

All 230 participants completed the study, their checklist data were inputted into software, and sample loss was zero. The mean±standard deviation of the age and BMI of the participating patients were 48.55±6.80 years and 23.16±2.29, respectively. In total, 108 participants received 6-9 chemotherapy sessions (32.72%), 12 participants were tobacco users, and 4 participants were alcohol users. Demographic data of the participants are presented in Table 1.

Table 1. Demographic data of women with breast cancer undergoing chemotherapy

Variable		M±SD -N(%)
Age (Year) M±SD		48.55±6.80
40-50 years N (%)		190(57.57)
50 – 60 Years N (%)		90(27.27)
>60 Years N (%)		50(15.16)
Body Mass Index	Lightweight N (%)	170(51.51)
	Normal N (%)	72(21.81)
	Overweight N (%)	66(20.00)
	fat N (%)	22(06.65)
Number of chemotherapy sessions		
3-6 N (%)		62(19.39)
6-9 N (%)		108(32.72)
9-12 N (%)		78(23.63)
>12 N (%)		80(24.25)
Smoking	Yes N (%)	308(96.36)
	No N (%)	12(03.64)

alcoholic drinks	Yes N (%)	326(98.78)
	No N (%)	4(01.22)
regular exercise	Yes N (%)	22(06.66)
	No N (%)	308(93.34)
Job	housewife N (%)	232(70.30)
	Employed N (%)	60(18.18)
	Retired N (%)	38(11.52)

Examining DVT suggested that the mean±standard deviation of this variable was 13.69±2.20. In other words, the majority of the participants were at moderate risk of DVT. It was also revealed that the majority and minority of the participants were, respectively, at low and high risks of DVT. The results concerning the risk of DVT are presented in Table 2.

Table 2. The risk of DVT in participants undergoing chemotherapy

Degree of risk of deep vein thrombosis	N (%)
Weak	**142(73.33)**
average	**50(15.15)**
High	**38(11.52)**

Doppler sonography results of patients with a high risk of DVT showed 34 participants with this problem, who needed treatment. On the other hand, examining effective risk factors of DVT (Table 3) indicate the relationship of the number of chemotherapy sessions with DVT (p = 0.001). Table 3 shows the results of the relationship between qualitative variables and DVT, based on regression and Spearman correlation.

Table 3. Relationship of qualitative variables with DVT in women with breast cancer undergoing chemotherapy based on the regression and Spearman correlation

Variable	Test statistics	P Value
Age (Year)	1.236*	0.22
BMI	1/552*	0.41

Number of chemotherapy sessions	-0.012$^{\alpha}$	0.001
Smoking	0.331$^{\alpha}$	0.33
alcoholic drinks	0.510$^{\alpha}$	0.18
regular exercise	0.314$^{\alpha}$	0.11
Job	0.259$^{\alpha}$	0.30
*: Regression α : Spearman		

Discussion

This study aimed to investigate the prevalence of DVT in women above 40 with cancer undergoing chemotherapy, who visited a chemotherapy clinic in Tabriz in 2018. The results indicated that the prevalence of DVT in women with breast cancer under chemotherapy was 10.3%, which was higher than the 7% prevalence reported by Kang et al. (2016) (14). They believe that chemotherapy is the main cause of DVT in cancer patients, which can be attributed to blood pressure drop, following chemotherapy. Their weakness, following chemotherapy, also necessitates absolute rest which, in turn, causes DVT. The results are inconsistent with the findings of Andrew et al. (2012), who reported a prevalence of 6% [17]. Gary et al. (2012) reported similar results - a prevalence of 11% [18]. They believed that having cancer and receiving chemotherapy make people vulnerable to DVT because of reactions with blood cells and blood clotting. They also believed that cancer accounts for 7% of DVT, requiring these patients to receive preventive measures. This study showed a relationship between chemotherapy and the number of chemotherapy sessions with DVT. It seems that in addition to cancer cell degradation, chemotherapy drugs can affect the coagulation factors by destroying blood cells and disrupting the coagulation system which, in turn, causes DVT. The results of the present study were consistent with the findings of Chopra et al. (2014) [19], who reported the number of chemotherapy sessions as a predictor of DVT. Fekri et al. (2014) reported a 20% of prevalence of DVT in cancer patients undergoing chemotherapy [20]. A higher prevalence of DVT has been reported during chemotherapy than during and after surgery. This is because, chemotherapy reduces circulation and quality of the coagulation system which, in turn, causes more cancer patients to develop DVT. The results of their study are consistent with the findings of the present study.

Conclusion

The results of the present study suggested that one out of ten women undergoing chemotherapy, following mastectomy, had DVT.

Limitations

Low sample size, exclusion of patients with a history of surgery, and exclusion of patients undergoing radiotherapy were among research limitations.

Recommendations

Researchers recommended the conduction of further studies with an emphasis on eliminating research limitations. Moreover, future studies are recommended to investigate clinical preventive measures for patients at the risk of DVT and the relationship of chemotherapy with thrombosis.

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