RESEARCH ARTICLE

Low awareness of venous thromboembolism among the general population: a call for increased public enlightenment programs

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Keywords

Venous thromboembolism • Awareness • General population • Deep vein thrombosis

Summary

Background. *Venous thromboembolism (VTE) is a notable but often ignored cause of disability and death. Improved public awareness of the symptoms and risks associated with VTE reduces the burden of disease.*

Aim. *We aimed to determine the awareness of VTE among the general population.*

Methods. *We conducted a population-based study using a pre-tested, pre-validated Ipsos-Reid questionnaire between October 2019 to March 2020. The questionnaire was distributed to consenting adults in the capital cities of Enugu and Ebonyi states of South-Eastern Nigeria to determine their awareness and knowledge of the symptoms and risk factors of VTE.*

Results. *A total of 284 adults participated with a mean age of 32.73 ± 10.33 years and majority (70.8%) had a post-secondary education. While majority were aware of other medical conditions like a heart attack (96.1%), stroke (97.2%), diabetes (98.2%), HIV/AIDS (98.6%), cancer (97.2%) and malaria (98.2), just a few of the subjects were aware of thrombosis (41.5%) and DVT (33.8%). Less than half (42.4%) correctly described DVT as a blood clot in the vein and 13.7% of the respondents knew what PE feels like. A minority of them knew the risk factors of VTE included hospital stay (19.0%), surgery (37.2%), cancer (31.6%), pregnancy (31.6%) and old age (29.6%). Age and gender showed no statistically significant association with awareness of VTE, p value, 0.491 and 0.287, respectively.*

Conclusion. *The awareness of VTE in the general population is low. Public awareness programs should be a public health priority to reduce morbidity and mortality associated with VTE.*

Introduction

Venous thromboembolism is a clinical disorder comprising of deep venous thrombosis (DVT) and pulmonary embolism (PE). They occur as a result of abnormal formation of blood clots within the vessels, and in this case, more commonly in the deep veins of the lower limbs and the pulmonary vasculature [1, 2]. DVT can also occur in the veins of the upper limbs [3]. PE typically occurs following a DVT and can be life threatening [2].

VTE is a preventable disease that has been largely ignored and has continued to cause significant morbidity and mortality. It is considered to be amongst the leading contributors to disease burden worldwide, and has been recognised as a growing public health concern [1, 4]. It is associated with an increased risk of morbidity and mortality especially in hospitalised patients [5]. This increased risk can partly be attributed to paucity of knowledge about the risk factors that cause VTE, ability to recognise clinical features of VTE as most of them are non-specific, and ability to seek urgent clinical attention. There are several studies assessing the awareness and knowledge of VTE and use of thromboprophylaxis in different population of subjects including clinicians, patients and nurses [6-9]. Results show a varying level of awareness and knowledge depending on the population under study, while it may be good among clinicians, there is still lack of adequate knowledge among patient population. Furthermore, in surveys seeking the level of knowledge and practice pattern of thromboprophylaxis among physicians, there still exist conflicting reports with knowledge gap [6, 8].

There is dearth of data on the awareness of VTEs amongst the general population. A survey by Wendelboe et al, to evaluate the global public awareness of VTE showed that on a global level, public awareness about thrombosis overall, and VTE in particular, is low, with suggestions that campaigns to increase public awareness about VTE were needed to reduce the burden from this largely preventable thrombotic disorder [10].

The gap in knowledge on VTE, and the need to bridge this gap led to several calls to raise public awareness about VTE [11, 12]. The International Society on Thrombosis and Haemostasis (ISTH) in 2014 heeded to these calls, and declared 13 October as World Thrombosis Day. This day is set aside specifically to propagate the knowledge of VTE, with several countries all over the world including Nigeria celebrating this day annually.

In order to assess the degree of awareness about VTE, the extent of recognition of the symptoms and signs of deep vein thrombosis (DVT) and pulmonary embolism

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(PE), and knowledge about the key risk factors for VTE amongst the general population, this survey was designed. The ultimate goal of this survey is to use the information gathered to inform future World Thrombosis Day campaigns to enhance awareness about VTE among the general public, thereby contributing to the reduction of morbidity and mortality associated with VTE.

Methods

This was a population-based study was carried out in the state capital cities of Enugu (Enugu) and Ebonyi (Abakaliki) states. Both states are part of the six geopolitical zones in south-east Nigeria with Igbo as the major ethnic group.

Using modified, pretested and pre-validated Ipsos-Reid questionnaire, a survey was conducted between October 2019 to March 2020 to assess the awareness of VTE, which includes DVT and PE compared to other thrombotic and non-thrombotic disorders such as heart attack, stroke, diabetes and malaria among the general public. Close ended questions were asked about awareness of risk factors for VTE as well as the symptoms and signs of DVT and PE. Both correct and incorrect options were offered in the response options offered.

The demographic data including age, gender, state of origin etc were collected. The survey required about 5 to 10 minutes to complete and where needed, interpreters (who are also members of the research team) were used to assist participants in their local dialects. Statistical analysis: Data was analysed using statistical package for social sciences (SPSS) version 22. Data was presented in prose and Tables.

Tab. I. Socio-demographic features of respondents.

Variables	Frequency (n = 284)	Per cent
Sex		
Male	155	54.6
Female	129	45.4
Age group (years)		
15-24	70	24.6
25-34	105	37.0
35-44	76	26.8
45-54	23	8.1
≥ 55	10	3.5
Mean age = 32.73 ± 10.33 years		
Education level		
Primary	4	1.4
Secondary	79	27.8
Tertiary	138	48.6
Postgraduate	63	22.2
Occupation		
Business/trading	34	12.0
Student	83	29.2
Lecturer/teacher	45	15.8
Professional/ health worker	11	3.9
Public servant	15	5.3
Civil servant	75	26.4
Artisan/self employed	15	5.3
Unemployed	6	2.1
State of origin		
Ebonyi	113	39.8
Enugu	93	32.6
Imo	28	9.9
Anambra	20	7.0
Abia	11	3.9
Others	19	6.7

Results

Demographic data

The total participants in the survey were numbered 284, which constituted 155 (54.6%) males and 129 (45.4%) females. The mean age of participants was 32.73 ± 10.33 years, and the most represented age category was the 25-34 years old. Most (138, 48.6%) of the participants had obtained a tertiary level education and involved in occupations including civil service, lecturing, and business/trading, accounting for 26.4%, 15.8% and 12.0% respectively. The survey participants were residents of Enugu and Abakaliki in Enugu and Ebonyi states respectively, who originates from the 5 states in South-eastern Nigeria (Tab. I).

Awareness of and concerns over VTE as a medical condition

The survey reveals a relatively low awareness of DVT (33.8%) and thrombosis (41.5%). The awareness of other conditions was high, they include heart attack 96.1%, stroke (97.2%), diabetes mellitus (98.2%), HIV/AIDS (98.6%), cancer (97.2%) and malaria (98.2%). Haemo-distension syndrome which is not a true medical condition had the lowest level of awareness (25.4%). It was introduced in other to check over-agreement. This typically reveals how low the awareness of VTE could be. In response to the level of concerns of among the participants toward listed medical conditions, the survey finds that 36.4% and 38.6% were extremely concerned over thrombosis and DVT respectively, while extreme concerns for other medical conditions ranged from 59.7% to 66.9%. Extreme concerns were highest for HIV/AIDS (Tab. II).

Recognition of symptoms and signs of VTE.

About half (128, 50.2%) of our respondents were not sure of the cause of DVT and108 (42.4%) correctly said it was due to blood clot in the vein. Other causes listed include lack of oxygen in the vein (7, 2.7%) and a tumour in the vein (7, 2.7%). Five (2.0%) of the respondents said the cause was not listed. When asked the knowledge of what DVT would feel, 240 (84.5%) answered no while 44 (15.5%) said yes. When asked about symptoms of blood clot, leg sweeling (131, 67.2%) was the highest in

Tab. II. Concerns about risk of medical conditions

Medical conditions	Responses				
	Extremely not concerned (1)	Not concerned (2)	Rarely concerned (3)	Concerned (4)	Extremely concerned (5)
Heart attack	35 (13.4)	21 (8.0)	24 (9.2)	20 (7.6)	162 (61.8)
Thrombosis	68 (30.9)	23 (10.5)	18 (8.2)	31 (14.1)	80 (36.4)
Stroke	34 (13.0)	17 (6.5)	25 (9.6)	25 (9.6)	160 (61.3)
Diabetes	30 (12.1)	18 (7.3)	23 (9.3)	29 (11.7)	148 (59.7)
Deep vein thrombosis	72 (32.7)	29 (13.2)	17 (7.7)	17 (7.7)	85 (38.6)
HIV/AIDs	42 (16.0)	17 (6.5)	13 (4.9)	15 (5.7)	176 (66.9)
Cancer	25 (9.7)	19 (7.4)	21 (8.2)	22 (8.6)	170 (66.1)
Malaria	28 (10.6)	18 (6.8)	22 (8.3)	29 (11.0)	167 (63.3)

frequency, followed by pain or tenderness in the leg (79, 40.5%) and colour change (64, 32.8%). Others are leg paralysis (58, 29.7%), differential warmth (45, 23.1%) and leg itching (44, 22.6%).

Awareness of the symptoms of blood clot was relatively low, ranging from 22.6% to 40.5%, except for 67.2% who were aware of Leg Swelling as a symptom of blood clot. The awareness of the clinical features of PE ranged from 21.8 % to 56.3%, where Shortness of breath and chest pain were the most common symptoms identified by the participants, constituting 56.3% and 51.0% respectively; followed by coughing out blood (40.8%) light headedness or passing out (24.3%), and rapid heart rate (30.6%). Only 13.7% knew what PE would feel like. Again, some wrong options like slow shallow breath (66%), pain radiating down to the arm (22.3%), and frequent headache (21.8%") were selected by our study respondents as features of PE which were actually included to check over-agreement. This study finds that awareness of the symptoms of VTE is relatively poor among the participants.

Tab. III. Awareness of risk factors of blood clot.

Variable	Frequency	Per cent
Risk factors (multiple response, n = 957)		
Hospital stay	48	19.0
Surgery	94	37.2
Cancer	80	31.6
Immobility	118	46.6
Pregnancy or just giving birth	80	31.6
Use of oral contraception pills or hormone replacement therapy	65	25.7
A family history of clot	86	34.0
Older age (65years plus)	75	29.6
Too much exercise	32	12.6
High blood cholesterol	99	39.1
Donating blood	34	13.4
High blood pressure	69	27.3
Other factors	5	2.0
None	3	1.2
Not sure of any	69	27.3

Risk factors for VTE

Participants showed low awareness of the risk factors of VTE which include hospital stay, surgery, cancer, immobility, pregnancy, use of contraception, family history and old age constituted 19.0%, 37.2%, 31.6%, 46.6%,31.6%, 25.7%, 34.0% and 29.6% respectively. Some of the participants picked wrong options like too much exercise (12.6%), high blood cholesterol (39.1%) and donating blood (13.4%) as risk factors of VTE (Tab. III).

Assertions to blood clot awareness

Assertions were made to certain statements about blood clot, where 48.9% Strongly disagree that people under 40 years do not have to worry about blood clot; 43.8% Strongly disagree that Most blood clots cannot be prevented; 35.2% Strongly disagree that it is not likely that an untreated blood clot can travel to the lungs; 53.1% strongly disagree that having a blood clot is not considered a medical emergency while 70.8% strongly agree that Blood clot can cause death.

Fishers' Exact test and logistic regression finds no statistical significance in the association between VTE and sex nor with age at 95% confidence interval and 0.05 alpha level. However, females were more aware of VTE: thrombosis (45.0%) and DVT (39.5%) than males, with 38.7% for thrombosis and 29.2% for DVT (Tab. IV).

Discussion

This study was designed to evaluate the extent of the public knowledge and perception of the risks, symptoms, and complications of venous thromboembolism. The findings were then compared to their knowledge of other diseases of public health importance such as Malaria, Myocardial infarction, Diabetes, HIV/AIDS etc.

The study showed a generally low levels of awareness of VTE as a medical condition as majority of the respondents were not able to identify VTE as such. The awareness of the causes and risk factors of VTE among the general population was also found to be low likewise the knowledge about the clinical features of the condition. Significantly and to further buttressed

Tab. IV. Influence of sex and age on awareness of medical conditions.

Medical conditions	Sex				Age group			
	Male	Female	P-value	OR (95%CI)	≤ 35 years	> 35 years	P-value	OR (95%CI)
Heart attack	150 (96.8)	123 (95.3)	0.554	1.2 (0.63, 2.33)	178 (95.7)	95 (96.9)	0.753	1.3 (0.48, 3.40)
Thrombosis	60 (38.7)	58 (45.0)	0.287	0.9 (0.71, 1.11)	80 (43.0)	38 (38.8)	0.491	0.9 (0.64, 1.24)
Stroke	152 (98.1)	124 (96.1)	0.475	1.5 (0.60, 3.62)	180 (96.8)	96 (98.0)	0.719	1.4 (0.41, 4.67)
Diabetes	154 (99.4)	125 (96.9)	0.180	2.8 (0.48, 15.98)	182 (97.8)	97 (99.0)	0.662	1.7 (0.30, 10.11)
Deep vein thrombosis	45 (29.2)	51 (39.5)	0.068	0.8 (0.63, 1.03)	58 (31.2)	38 (39.2)	0.178	1.3 (0.91, 1.74)
HIV/AIDs	152 (98.1)	128 (99.2)	0.629	0.7 (0.41, 1.29)	183 (98.4)	97 (99.0)	1.000	1.4 (0.25, 7.62)
Cancer	152 (98.1)	124 (96.1)	0.475	1.5 (0.60, 3.62)	179 (96.2)	97 (99.0)	0.270	2.8 (0.45, 17.71)
Malaria	153 (98.7)	126 (97.7)	0.662	1.3 (0.47, 4.03)	183 (98.4)	96 (98.0)	1.000	0.9 (0.29, 2.55)
Haemo-distension syndrome	41 (26.5)	31 (24.0)	0.682	1.1 (0.84, 1.34)	44 (23.7)	28 (28.6)	0.391	1.2 (0.83, 1.67)

Sex = female; Age ≥ 35 years.

this finding, more than half of the participants showed little or no interest concerning the risk factors of VTE, while majority of the participants admitted to having little or no idea of the likely symptoms of VTE. However, they had impressive knowledge of other medical conditions of public health importance such as myocardial Infarction, malignancy, malaria, cerebrovascular accidents, and HIV/AIDS.

The above findings are in keeping with those noted in similar studies done elsewhere like the Mcfarland et al. ExPeKT (Exploring prevention and knowledge of venous thromboembolism: a two stage, mixed method study protocol study of 2013 [13] and the findings of Boulton et al. from a street survey done in Birmingham United Kingdom [14]. However, ours is one of first studies evaluating awareness of VTE in the general population in a developing country.

The study findings showed that for the participants that had prior knowledge of the symptoms of venous thrombosis, leg swelling, pain or tenderness on leg and noticeable skin changes were the most frequently identified while slow shallow breath, shortness of breath and chest pain were the most frequently identified symptoms or pulmonary embolism. In addition, amongst this group the most implicated risk factors for VTE were in descending order, extended periods of immobility, increased levels of serum cholesterol, surgery, family history of VTE, malignancies and pregnancy/puerperium. Other mentioned risk factors were high blood pressure, old age and use of oral contraceptives.

Interestingly some members of this group, did not have any idea/were not sure of any risk factors of VTE, while others cited too much exercise and blood donation as risk factors of VTE.

The impact of socio-demographic factors on awareness of the risk factors of VTE was also noted in the study. It showed females and Individuals below 35 years were more likely to be better informed more than males about the symptoms and risk factors of VTE. Probable reasons for this are that a significant percentage of women already associate VTE with the use of oral contraceptives, also generally, women tend to show more interest in diseases especially if they are of public health importance.

Strength and limitations

There might have been overestimation of the true awareness since we included a number of closed-ended questions to evaluate the population-based knowledge which could have affected it, however, we included a number of incorrect options to help check over agreement and at the same time include questions that may check their knowledge if they were to have the condition. Again, this study was not internet based unlike a previous similar study [10] which could have limited participation by those who do not have access to internet. We carried out the study in among individuals we met at public gatherings like markets, academic meetings, churches, etc. However, we might have missed the elderly ones who may not be able to come out due to ill health and whom may have experienced the condition, being in the age group at increased risk of VTE.

Conclusions

The awareness of VTE in the general population is low. Participants were more concerned about other medical conditions when compared to VTE. A good number of them had no knowledge of the risk factors and clinical features of VTE. The creation of awareness programs should be a public health priority to reduce morbidity and mortality associated with VTE.

What is known?

The awareness of VTE among different populations has been determined including among health workers and hospitalize patients. VTE awareness has also been determined among the general population in the developed world but not in south-eastern Nigeria.

What is new?

This study provides the data on the level and determinants of awareness of VTE among the general population in a developing country.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

The concept and design of the study were done by Dr Helen Okoye and Dr Nwagha while the all authors contributed in the literature review collection of data, and preparation and editing of the manuscript for publication.

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