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PRACA ORYGINALNA
ORIGINAL PAPER

Awareness of venous thromboembolism during long-haul flights among medical students – what do they really know about its prevention and treatment?

Świadomość studentów medycyny na temat żylnej choroby zakrzepowo-zatorowej podczas długotrwałych lotów samolotem – co tak naprawdę wiedzą o jej prewencji i leczeniu?

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ABSTRACT

INTRODUCTION: Worldwide air traffic reaches about 2.3 billion passengers annually. A complication of long-haul flights is venous thromboembolism (VTE). It manifests itself as deep vein thrombosis (DVT) and/or pulmonary embolism (PE). Despite the relatively high incidence of this disease, access to information about its risk factors as well as effective prevention is limited due to a small number of generally available articles and also the lack of sufficient attention to this problem by lecturers and doctors. In the study, an assessment of the awareness and knowledge related to the risk of VTE during long-haul flights among medical students was performed.

MATERIAL AND METHODS: The study was performed from 10th of November 2017 till 28th of February 2018 in a group of 100 medical students from the Medical University of Silesia in Katowice. The study was conducted based on a survey questionnaire, which included 12 questions concerning the knowledge of the incidence and pathogenesis of VTE connected with long-haul flights. The participants of the study based their responses on knowledge acquired at university.

RESULTS: The correct incidence rate of VTE associated with air flights was indicated by 43% the respondents. None of the students correctly indicated the VTE risk factors. 40% of the respondents was familiar with the pathogenesis of VTE occurring as a result of flights. The fact that 100% was aware that appropriate clothing can reduce the risk of VTE during flights was satisfying.

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CONCLUSIONS: The survey results show a low level of knowledge as well as awareness of the risk of VTE during flights in the population of the medical university students. The results of the survey should be included in the planning of the scope of classes in medical studies on the problems of VTE.

KEY WORDS

venous thromboembolism, deep vein thrombosis, pulmonary embolism

STRESZCZENIE

WSTĘP: Ogólnoświatowy ruch samolotowy osiąga rocznie liczbę 2,3 miliarda pasażerów. Powikłaniem długich lotów samolotem jest żylna choroba zakrzepowo-zatorowa (*venous thromboembolism* – VTE). Obejmuje ona zakrzepicę żył głębokich (*deep vein thrombosis* – DVT) i zatorowość płucną (*pulmonary embolism* – PE). Pomimo stosunkowo dużej częstości występowania tej choroby dostęp do informacji na temat czynników ryzyka oraz prewencji VTE jest ograniczony, co może wynikać ze zbyt małej liczby ogólnodostępnych artykułów dotyczących problemu, jak również z niedostatecznej uwagi poświęcanej tej jednostce chorobowej przez wykładowców i lekarzy. W pracy podjęto próbę oceny świadomości i wiedzy studentów medycyny na temat powikłań zakrzepowych związanych z długotrwałymi lotami samolotem.

MATERIAŁ I METODY: Badanie przeprowadzono między 10 listopada 2017 r. a 28 lutego 2018 r. w grupie 100 studentów medycyny Śląskiego Uniwersytetu Medycznego w Katowicach. Do badania wykorzystano kwestionariusz ankiety, który zawierał 12 pytań dotyczących wiedzy na temat występowania i patogenezy VTE związanej z długotrwałymi lotami samolotem. Uczestnicy badania opierali swoje odpowiedzi na wiedzy zdobytej podczas nauki na uniwersytecie.

WYNIKI: Prawidłowo częstość występowania VTE związanej z lotami samolotem wskazało 43% ankietowanych. Żaden ze studentów nie wskazał poprawnie czynników ryzyka VTE. Spośród badanych 40% znało patogenezę VTE w wyniku długotrwałych lotów. Zadowalający jest fakt, że 100% ankietowanych wiedziało, że odpowiedni ubiór może redukować ryzyko VTE podczas lotów samolotem.

WNIOSKI: Ankieta wykazała niski poziom wiedzy, jak również świadomości studentów związanej z zagrożeniem VTE podczas lotów samolotem. Wyniki badania powinny zostać uwzględnione podczas planowania na studiach medycznych zajęć dotyczących problematyki VTE.

SŁOWA KLUCZOWE

żylna choroba zakrzepowo-zatorowa, zakrzepica żył głębokich, zatorowość płucna

INTRODUCTION

Venous thromboembolism (VTE), which can manifest itself as a deep vein thrombosis (DVT) and/or pulmonary embolism (PE) is an astonishing problem of contemporary medicine. Despite increasing knowledge in this area, VTE is one of the most underestimated medical issues of the 21st century. The estimated VTE incidence rate is 1–2/1000 people per year in the global population. In Poland, the estimated incidence of VTE is 5700 people annually [1]. Among different risk factors of VTE, one of the most crucial ones is immobilisation of the lower limbs, which is associated with a marked increased risk of VTE [2]. One of the relatively common situations in which DVT and PE may occur in an average patient with risk factors is long-haul flights. In this clinical scenario, the incidence of symptomatic PE is extremely low, but there is a substantial increase when the distance travelled is more than 5,000 miles (1.5 PE per million passengers) or the flight duration is more than 8 h (2.57 PE per million passengers) [3].

Despite the development of diagnostic methods, most cases of DVT remain unrecognized. It applies to both proximal DVT (popliteal vein, femoral vein, iliac vein and inferior vena cava), which is diagnosed only in around 50% of affected patients and distal DVT (below the knee) which is diagnosed in up to 20% of patients only [4]. It is essential to be aware of the epidemiology, symptoms and risk factors of the disease and proper antithrombotic management regarding prevention. Among the DVT prophylaxis used in this clinical scenario, aggressive mobilization, the use of the medical compression socks as well as (if required) pharmacological thromboprophylaxis by means of low molecular weight heparin should be mentioned [5].

Venous thromboembolism is one of the most underrated diseases both by patients and medical staff because of the prevailing lack of symptoms, non-specific symptoms and inadequate awareness of this issue. It is reasonable to increase awareness about the occurrence of VTE among patients as well [6,7,8]. It is recommended that airlines become more proactive in educating passengers concerning the danger of VTE and in promoting passenger activity that can reduce risk [9]. Airlines should also work to avoid cramped seating conditions (seat size and pitch) that contribute to prolonged immobility [9]. Increased long-haul air traffic and an aging population suggest that travel-related VTE may present a growing healthcare threat [9].

Education equally about the prevalence, consequences, prophylaxis possibilities and treatment of VTE is part of the curriculum of medical faculties at medical universities in Poland [10]. The task of future doctors is to acquire knowledge about the pathophysiological basis, as well as proper procedures in a group of predisposed patients [10]. In this study, an attempt was made to assess the awareness of medical students about the occurrence of VTE during long-haul flights.

MATERIAL AND METHODS

The study was performed in a group of 100 fourth-year medical students from the Medical University of Silesia in Katowice. The study was conducted based on a survey questionnaire, which included 12 questions concerning the knowledge of the incidence and pathogenesis of VTE connected with long-haul flights (Table I). In the questionnaire, questions regarding prevention and the risk factors dedicated to this group of patients were asked. Moreover, there were questions aiming to assess the students' problem-solving skills concerning particular clinical cases. The respondents based their answers on the knowledge acquired at the university during their studies. The survey was anonymous and it was conducted from 10th of November 2017 till 28th of February 2018. The authors aimed to make the research tool clear and to provide an appropriate number of categorized questions: single-answer, multiple-choice and open-ended questions. The results of the study were expressed as totals and percentages.

Table I. Questions in questionnaire regarding knowledge of incidence and pathogenesis of venous thromboembolism (VTE) among medical students
Tabela I. Ankieta dotycząca wiedzy studentów medycyny na temat częstości występowania i patogenezy żylnej choroby zakrzepowo-zatorowej (VTE)

1. Year of study:					
2. Has any member of your family over 40 years of age ever taken a long-haul flight (more than 8 h)?					
a) yes			b) no		
3. If you answered *yes* to Question 2, did this person experience VTE after the flight?					
a) yes			b) no		
4. Have you or anyone from your family used antithrombotic prophylaxis before a long-haul flight?					
a) yes			b) no		
5. How many people taking long-haul air flights, not using antithrombotic prophylaxis can develop DVT?					
a) up to 10%	b) 15–20%	c) 20–30%	d) 30–40%	e) more than 40%	
6. The factors elevating the risk of developing VTE during long-haul flights are (choose all the correct answers):					
a) obesity	b) pregnancy	c) taking oral contraception	d) recent surgeries	e) drinking alcohol	f) drinking coffee
g) history of cancer	h) advanced age	i) thrombophilia	j) flight at high altitude	k) flight at low altitude	l) all the above
7. What kind of preventive measure for DVT would you recommend?					
a) clothes compressing the lower extremities, loose around the waist	b) clothes compressing lower extremities and waist	c) loose clothing, not compressing the lower extremities or waist			
d) loose clothes, not compressing lower extremities, compressing waist	e) the type of clothing does not matter in the prevention of VTE				
8. What kind of preventive measures for DVT would you recommend? (choose all the correct answers):					
a) drinking about 3 glasses of wine during the flight	b) drinking large amounts of water				
c) drinking large amounts of caffeinated beverages	d) refraining from drinking alcohol				
9. What kind of prevention (if any) would you recommend a healthy 23-year-old man travelling from Katowice to Rio de Janeiro (14 h of immobilization)? (choose all the correct answers):					
a) comfortable clothes	b) clothes compressing lower extremities and waist				
c) drink alcohol	d) stretching exercises				
10. What kind of prevention (if any) would you recommend a 60-year-old man with BMI = 30 and varicose veins who plans to take an 8-hour flight? (choose all the correct answers):					
a) compression socks	b) stretching exercises	c) comfortable, loose clothes	d) aspirin	e) LMWH	
11. What kind of prevention (if any) would you recommend a 60-year-old man after a hip endoprosthesis implantation 4 months before the flight and currently undergoing chemotherapy related to lymphoma? (choose all the correct answers):					
a) preventive dose of LMWH	b) compression socks	c) stretching exercises	d) preventive dose of aspirin		
12. What is the crucial risk factor of DVT associated with long-haul flights?					
a) flight at high altitude	b) immobilization				
c) type of clothes passenger is wearing	d) sleeping in sitting position				

VTE – venous thromboembolism; DVT – deep vein thrombosis; BMI – body mass index; LMWH – low-molecular-weight heparin.

RESULTS

Almost half of the respondents (45%) answered that some of the members of their families over 40 years of age had taken a long-haul flight (lasting longer than 8 h) and none of them had an episode of VTE related to the flight. When asked about prevention, only 3% of the students pointed out that they or someone they knew used some preventive procedures. All of them indicated low-molecular-weight heparin (LMWH). 43% of the participants knew the probability of developing DVT during a long-haul flight without any prophylaxis. The next question assessed knowledge about the risk factors that increase the development of VTE during long-haul flights. Obesity was pointed out by 96% of the respondents, oral contraception was indicated by 85%, and 75% of the students knew that pregnancy is one of the significant risk factors. Other risk factors are old age, thrombophilia, recent surgeries, drinking alcohol or coffee, and cancer in the medical history, which were indicated by 55% of the students (Fig. 1).

It is surprising that 60% of the participants thought that flying at a high altitude is a risk factor compared to a flight at low altitude.

Almost all of the respondents (95%) knew that the clothes that we wear during the flight have an impact on the development of DVT. In terms of prevention, consuming large amounts of water and refraining from drinking alcohol are recommended, which were indicated respectively by 85% and 29% of the participants (Fig. 2).

The next question was associated with a clinical case; "What kind of prevention (if any) would you recommend a healthy 23-year-old man travelling from Katowice to Rio de Janeiro (14 h of immobilization)?". The correct answers, which were comfortable clothes and stretching exercises, were indicated respectively by 80% and 42% of the students. In the next case question, a 60-year-old man with BMI = 30 and varicose veins was planning to take an 8-hour flight, was presented. 66% of the respondents would recommend compression socks as prevention, 54% stretching exercises, and 71% comfortable, loose clothes. The combination of these correct answers was indicated by 64% of the students. Respectively 35% and 33% of the students would recommend taking an aspirin and LMWH, but both of these answers were incorrect. The students were also asked about recommendations regarding VTE prevention for a 60-year-old man after a hip endoprosthesis implantation 4 months prior to the flight and who was also undergoing chemotherapy related to lymphoma. The right answers were: taking a preventive dose of LMWH – indicated by 57%, wearing compression socks (55%), stretching exercises (42%) and comfortable clothes (49%). In this case, 28% of the students would recommend an incorrect prophylaxis for DVT – a preventive dose of aspirin (Fig. 3).

Finally, over 90% of the respondents were aware that immobilisation is the crucial risk factor of DVT associated with a long-haul flight.

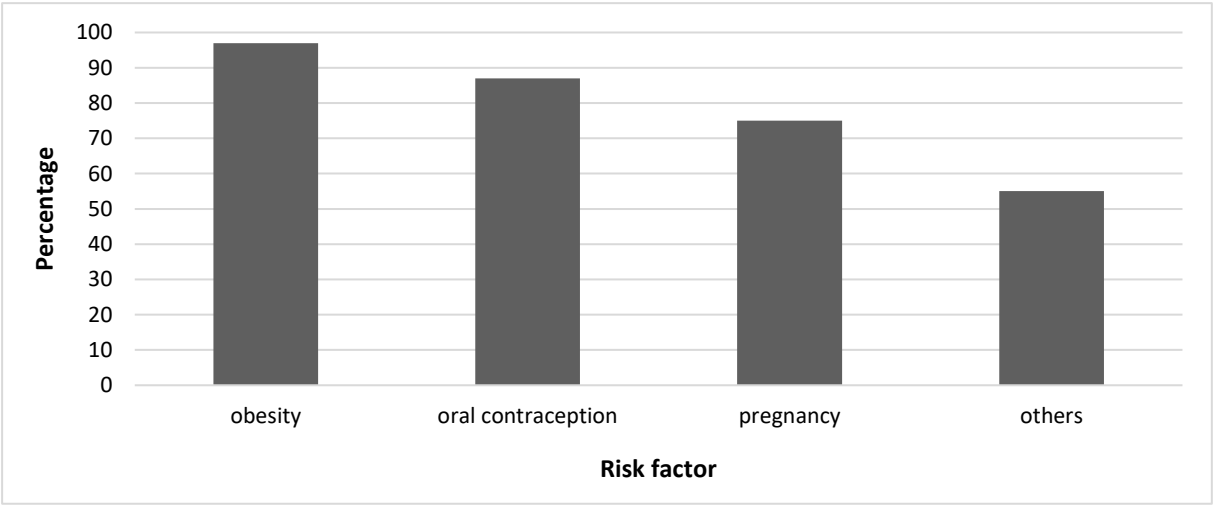

Fig. 1. Percentage of correct answers for particular risk factors of VTE.
Ryc. 1. Odsetek poprawnych odpowiedzi dotyczących poszczególnych czynników ryzyka VTE.

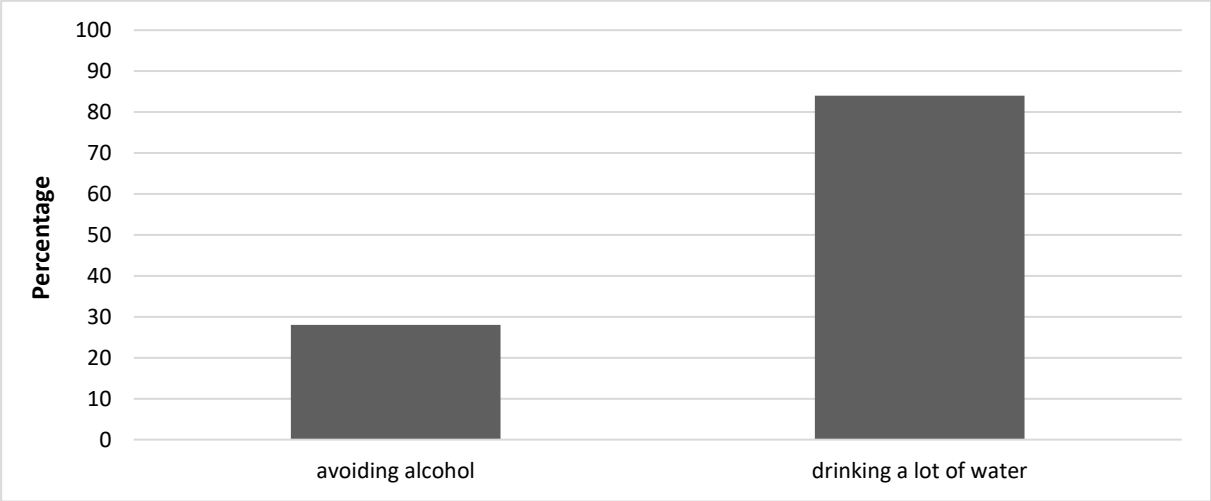

Fig. 2. Respondents' awareness in terms of particular methods of VTE prevention during long-haul flight.
Ryc. 2. Wiedza respondentów na temat poszczególnych metod prewencji VTE podczas długotrwałych lotów samolotem.

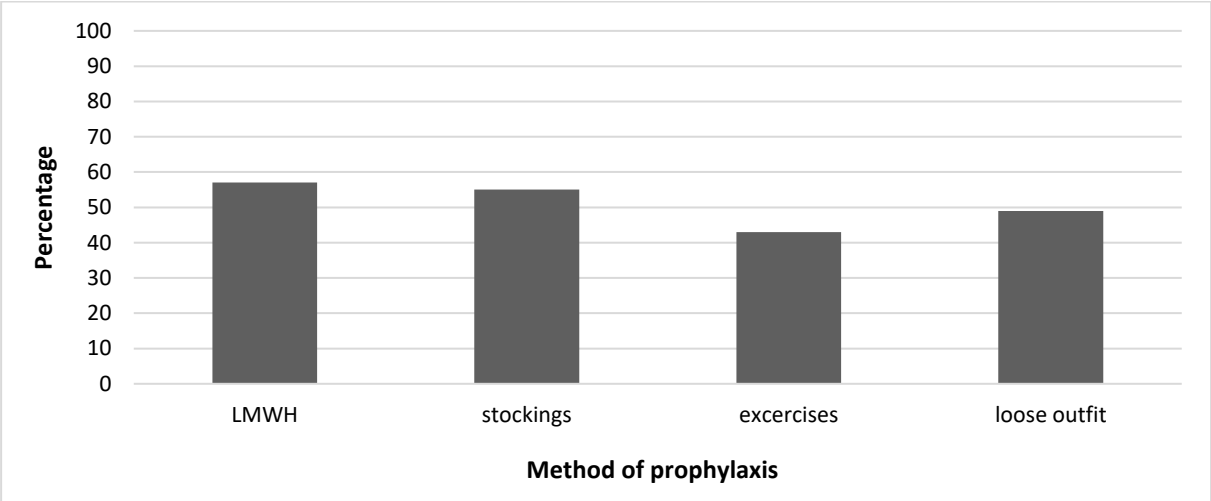

Fig. 3. Percentage of correct answers for methods of VTE prophylaxis during long-haul flight in patient undergoing chemotherapy.
Ryc. 3. Odsetek poprawnych odpowiedzi dotyczących profilaktyki VTE podczas długotrwałych lotów samolotem u pacjenta poddawanego chemioterapii.

DISCUSSION

The term "economy class syndrome" concerns to the prevalence of thrombotic events after long-distance air flights that mostly occur in passengers in the economy class of the aircraft and is rare, but still inevitable complication of long-distance air flights, especially in patients who have different intrinsic risk factors [11,12]. The tendency to affect even asymptomatic young people and the greater risk to fragment and spread to the pulmonary circulation are the main aspects of DVT of long-distance air flights participants [11,12].

According to the Bureau of Transportation Statistics, U.S. airlines and foreign airlines serving the U.S. carried over 1.0 billion passengers in 2018. Homans reported the first two cases of VTE connected with air travel in 1954, and since then a significant number of cases have been reported. Most of the early reports involved single cases or small series of patients [13,14,15,16].

The actual incidence of VTE in air travel is not determined. It is difficult to establish the prevalence owing to the fact that this affliction may be asymptomatic or can develop many days or weeks after the flight [11,17]. In a cohort of healthy subjects, the absolute risk of VTE on flights lasting more than 4 h was 1 in 6000 [11,18]. A meta-analysis involving 14 studies reported 4055 cases of VTE in trips lasting up to 8 h [11,19]. In these studies, at each increment of 2 h in travel time, there was an approximate 18% increase in the risk of VTE [11].

Despite the growing number of long-haul flights and flight-related VTE, there is still a lack of data concerning VTE prevention provided by airlines [20].

According to a study published in 2010, only a quarter (27 from 107) of airlines informed their passengers about the risk of VTE [21]. The British Airlines website provides important information about VTE risk factors and recommends methods of prevention such as drinking large amounts of water during the flight, avoiding alcohol and coffee, walking around the aircraft, wearing flight socks (provided in 1st class) during long-haul flights [22]. On the Polish airlines Lot website [23] there is no information about VTE and its prevention during the flight.

As it is probably not possible at this moment as a worldwide strategy, at least medical staff and all medical health care providers should be aware and sufficiently educated in the field of risk factor assessment, prophylaxis as well as the diagnostics and treatment of DVT. This education should remain an important part of pre- and post-graduate training, as well as a part of continuous education in most medical specializations due to the possible fatal complications of DVT, which can lead to PE [10,24]. The present study demonstrates the lack of sufficient awareness of the epidemiology, prevention and as well as the lack of sufficient knowledge concerning the risk factors among medical students, including the group of medical faculty students in their last year. Based on our study results, action towards increasing medical students' awareness, as well as action towards more practical education in this field in the medical faculty of the medical university should be proposed. Although the study programme includes VTE, the knowledge of students in the field of the epidemiology and prevention of this affliction is still limited. According to the results of the study, it is advisable to take action, including educative effort, which should lead to increased awareness of future medical staff about problems related to VTE [10].

Nowadays, in an era in which people can easily discover the farthest corners of the world by choosing to travel by plane, the awareness of a serious complication of long-haul flights should be immediately increased. Venous thromboembolism after air travel was first recorded in 1954, but since then the knowledge about this serious disease is still not satisfying among the population [25]. The most frequently chosen method of prevention is taking an aspirin (acetylsalicylic acid), which is not correct. Passengers of long-haul flights should avoid drinking alcohol, and drink copious amounts of water to avoid dehydration – one of the risk factors of thromboembolism. Stretching exercises and straining the lower leg muscles are recommended but not many people know about it. The poor knowledge about the VTE and its risk factors result in the fact that passengers do not connect it with flights. As the survey shows, the level of awareness of VTE was lower than that for other serious diseases such as heart attack and stroke (88% and 85%, respectively). In particular, it is not surprising that their findings show that only 45% of respondents were aware that blood clots were preventable [8]. People's awareness regarding prevention should be increased mainly by the most popular airlines.

CONCLUSIONS

Despite the presence of the VTE in the medical curriculum, students' knowledge regarding the prevalence, risk factors and prevention of this disease during long-haul flights is not at all satisfying. Considering the results of the study, some actions should be taken to improve students' awareness in terms of VTE associated with immobilisation during long-haul flights.

Author's contribution

Study design – T. Urbanek
Data collection – M. Wołkowski, M. Zembura, E. Wojciechowska, J. Witkowska
Data interpretation – M. Wołkowski, M. Zembura, E. Wojciechowska, J. Witkowska, T. Urbanek
Statistical analysis – M. Wołkowski, M. Zembura, E. Wojciechowska, J. Witkowska, T. Urbanek
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Literature research – M. Wołkowski, M. Zembura, E. Wojciechowska, J. Witkowska, T. Urbanek

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