

# Wearing elastic compression stockings during long-haul flights prevented the development of deep venous thrombosis

Scurr JH, Machin SJ, Bailey-King S, et al. Frequency and prevention of symptomless deep-vein thrombosis in long-haul flights: a randomised trial. *Lancet*. 2001 May 12;357:1485-9.

## QUESTION

In passengers on long-haul flights, does wearing class-I elastic compression stockings while flying prevent the development of deep venous thrombosis (DVT)?

## DESIGN

Randomized (unclear allocation concealment\*), blinded (outcome assessor)\*, controlled trial with 48-hour follow-up.

## SETTING

Stamford Hospital, London, United Kingdom.

## PATIENTS

231 persons who were 56 to 68 years of age (mean age 62 y, 61% women) and who intended to travel economy class with 2 sectors of  $\geq 8$  hours' duration within 6 weeks of enrollment (median flying time 24 h [interquartile range 19 to 35 h] for stocking group, 22 h [interquartile range 18 to 36 h] for control group). Exclusion criteria were episodes of venous thrombosis, use of anti-coagulants, regular use of compression stockings, cardiorespiratory problems, or any other serious illness. 87% of participants completed the study and were included in the analysis.

## INTERVENTION

Participants were allocated to class-I (German Hohenstein compression standard; 20 to 30 mm Hg) below-knee elastic compression stockings ( $n = 115$ ) or no stockings ( $n = 116$ ). Participants were advised to put on the stockings before departure and to remove the stockings after arrival for every flight they took.

## MAIN OUTCOME MEASURE

Presence of DVT confirmed by duplex ultrasonography.

## MAIN RESULTS

Analysis was by intention to treat. At 48 hours after flight travel, no participants in the stocking group had symptomless DVT, whereas 12 participants in the control group did ( $P < 0.001$ )<sup>†</sup> (Table). 4 participants in

the stocking group had superficial thrombophlebitis, whereas no participants in the control group did ( $P = 0.04$ )<sup>†</sup> (Table).

## CONCLUSION

In passengers on long-haul flights, wearing class-I elastic compression stockings while flying prevented the development of symptomless deep venous thrombosis but increased the risk for superficial thrombophlebitis.

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\*See Glossary.

<sup>†</sup> $P$  values calculated from data in article.

### Class-I elastic compression stockings vs no stockings during long-haul flights<sup>‡</sup>

Outcomes at 48 h	Stockings	No stockings	RRR (95% CI)	NNT (CI)
Deep venous thrombosis	0%	12%	100% (69 to 100)	9 (6 to 15)
			RRI	NNH (CI)
Superficial thrombophlebitis	4%	0%	$\infty$	25 (13 to 629)

<sup>‡</sup>Abbreviations defined in Glossary; RRR, RRI, NNT, NNH, and CI calculated from data in article.

## COMMENTARY

For years, it has been assumed that taking long airplane trips was associated with an increased risk for DVT—the so-called economy class syndrome. However, despite this assumption, few hard data exist to quantitate the risk. One surprising finding in the study by Scurr and colleagues was the high incidence of asymptomatic thrombosis in the control group: 10%. Given the decreased sensitivity of ultrasonography for calf-vein thrombosis, this finding may be an underestimate. This rate of thrombosis approaches that for general-surgery patients. However, all the thrombi were asymptomatic calf-vein thrombi, and it is still unknown if more travelers were screened if an increase in the incidence of proximal vein thrombosis would be found. Also unknown is whether thrombosis rates would be higher in at-risk patients who were excluded from the study.

The cause of the thrombi is probably venous stasis that results from prolonged sitting. It has been known since World War II that sitting can predispose individuals to thrombosis. Although the

hypoxic cabin environment is often touted as a cause of thrombosis, recent data suggest that this is not the case, and in fact, hypoxia may actually increase fibrinolysis (1).

Elastic stockings are known to offer modest DVT protection in surgery patients. Stockings were effective and are an easily applied prophylactic measure, especially given the difficulties in trying to exercise in modern aircraft. It is still unknown whether patients at higher risk for thrombosis would benefit from more aggressive pharmacologic prophylaxis.

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## Reference

1. Grover RF, Bartsch P. Blood. In: Hornbein TF, Schoene RB, eds. High Altitude: An Exploration of Human Adaptation. New York: Marcel Dekker, 2001:493-523.