Venous thromboembolic complications following air travel: what's the quantitative risk? A literature review
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CRD summary
This review concluded that venous thromboembolism and oedema on long haul flights seem to be reduced with the use of class I and II below-knee graduated compression stockings. Aspirin is not useful, but low molecular weight heparin and profibrinolytics may be; further research is required. It is difficult to properly assess the reliability of this conclusion from the information presented.

Authors' objectives
To quantify the risk of venous thromboembolism (VTE) following air travel, and to assess the methods of preventing VTE following long haul flights. This summary focuses on the second objective.

Searching
PubMed, MEDLINE, EMBASE and the Cochrane Library were searched up to November 2004 for English language papers; the search terms were reported. The reference lists of major articles were also checked.

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs), controlled cohort studies, case-control studies and incidence studies were eligible for inclusion.

Specific interventions included in the review
Inclusion criteria for the interventions were not specified. The included studies assessed graduated below-knee compression stockings (ranging from 14 to 30 mmHg), low molecular weight heparin (LMWH), aspirin (400 mg once daily for 3 days) and the profibrinolytic agent pinokinase. The comparators were not specified but appeared to be no intervention.

Participants included in the review
Studies of people who had flown on a long haul flight (more than 6 to 7 hours’ duration inside the plane without transit or stopover) were eligible for inclusion. The included studies focused on individuals who were asymptomatic, or at high risk or low-to-medium risk for VTE.

Outcomes assessed in the review
VTE was the outcome of interest. It was defined as thrombosis of deep, superficial or muscle veins of the lower limbs and pulmonary embolism. Thrombosis of the cerebral and subclavian veins was excluded. All of the included studies used duplex scan to assess the presence of VTE.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the extraction.
The total number of participants in the intervention and control groups, the number of participants with a diagnosis of VTE, and the p-value for the between-groups difference were extracted.

**Methods of synthesis**

How were the studies combined?
The studies were discussed in a narrative synthesis.

How were differences between studies investigated?
Differences between the studies were reported in a table.

**Results of the review**

Eleven RCTs (n=2,948) were included, (there were 8 studies, three of which had 2 trials within the main study).

Graduated below-knee compression stockings (9 trials).

In 3 trials there were no cases of VTE in the control group, and in the remaining control arms the incidence ranged from 3.35% (n=6) to 10% (n=12). There was a reduction in incidence of lower limb VTE compared with control in 6 studies: 0% versus 10%, 0.24% versus 4.5%, 3.6% versus 4.82%, and 0% versus 3.35%, 4.2% and 7.6%. A reduction in leg oedema with stockings was also reported, though details were not provided.

LMWH and aspirin.

In a trial of LMWH single-dose injection before travel, there was a reduced incidence compared with control: 0% versus 4.2%. For participants who received a dose of aspirin, 3.6% experienced VTE and 13% experienced gastrointestinal side-effects.

Profibrinolytic agent.

The single trial showed a reduced incidence of VTE with profibrinolytic agent compared with control: 0% versus 7.6%.

**Authors’ conclusions**

The incidence of VTE and oedema on long haul flights seems to be reduced with the use of below-knee graduated compression stockings class I and II. LMWH and profibrinolytic agents are probably useful, but more research is needed. Aspirin was not useful and it caused gastrointestinal symptoms.

**CRD commentary**

There was a clearly stated review question, though inclusion criteria were not specified for the interventions of interest. Several relevant databases were searched for studies, but only English language studies were included and specific attempts were not made to locate unpublished studies. Therefore, relevant studies might have been missed and there is a risk of publication bias. The authors did not report using standard methods to reduce error and bias in the review process. Study quality was not assessed and the findings were not considered in the context of study quality. From the information presented it is difficult to draw a firm conclusion about the reliability of the authors’ conclusions, though they seem reasonable given the evidence presented.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors stated that further research is needed on the role of below-knee graduated compression stockings and LMWH and profibrinolytic agents, either alone or in combination with stockings, in the prevention of VTE. The usefulness of advice to drink plenty of fluid, move about on the aeroplane, stretch legs and avoid tight clothing also requires further research.
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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.