Sensitivity and specificity of the ankle-brachial index to diagnose peripheral artery disease: a structured review

Xu D, Li J, Zou L, Xu Y, Hu D, Pagoto SL, Ma Y

CRD summary
This review concluded that the ankle brachial index (0.90 or more) can be a simple and useful tool to identify peripheral artery disease with serious stenosis, and may be substituted for other non-invasive tests in clinical practice. The review had a number of methodological limitations, so these conclusions are unlikely to be reliable.

Authors' objectives
To determine the accuracy of the ankle-brachial index for the detection of significant stenosis (50% or more) in peripheral artery disease.

Searching
MEDLINE (from 1966), EMBASE (from 1990), Science Citation Index (from 1969), Biological Abstracts (from 1969), and the Cochrane Library were searched to December 2008. Search terms were reported and included a diagnostic filter. Reference lists of retrieved studies were screened. The review was restricted to published full-text English language studies.

Study selection
Studies that assessed ankle-brachial index (0.90 or more) for the diagnosis of stenosis of 50% or more in peripheral arteries were eligible for inclusion. The reference standard in eligible studies could be digital subtraction angiography, whole-body magnetic resonance angiography, Doppler waveform analysis, colour duplex ultrasound, colour duplex imaging or arteriography. Studies had to include at least 50 patients.

Included studies were conducted in China, Germany, India, the Netherlands, Sweden, UK and USA. Studies were conducted in an outpatient department, an academic centre, a community population, and elderly population, patients with type 2 diabetes, and patients with suspected peripheral artery disease. Ankle-brachial index measurements selected included higher of the two brachial pressures, lowest ankle-brachial index of both legs, only posterior tibial artery pressure, higher value, mean dorsalis pedis and posterior tibial artery pressure, and ratio of the maximum ankle pressure and the maximum brachial pressure. Studies were analysed on a per-patient or per-limb basis. Age of included patients ranged from 35 to 94 years (mean 59 to 76 years); 50% were male. The proportion of patients with diabetes was 36%, the proportion with dyslipidemia was 62%, the proportion with hypertension was 72%, and the proportion with history of smoking was 26%.

The authors did not state how studies were selected for inclusion.

Assessment of study quality
Studies were assessed for methodological quality according to criteria on study objective reported, consecutive patient enrolment, appropriate reference standard, prospective sample size calculation, use of threshold of 0.90 for ankle-brachial index, use of threshold for peripheral artery disease stenosis of 50%, and 2x2 data or predictive values reported.

The authors did not state how many reviewers performed the quality assessment.

Data extraction
Two reviewers independently extracted data on sensitivity and specificity. Authors were contacted for additional data where necessary.

Methods of synthesis
A narrative synthesis was presented.

**Results of the review**

Eight studies were included in the review (2,043 patients or limbs, range 94 to 298).

Diagnostic sensitivity of the ankle brachial index ranged from 15 to 79%; sensitivity was lower in the elderly and patients with type 2 diabetes, ranging from 15 to 71%. Diagnostic specificity ranged from 83 to 99%.

**Authors' conclusions**

The test of the ankle brachial index (≤0.90) could be a simple and useful tool to identify peripheral artery disease with serious stenosis, and may be substituted for other non-invasive tests in clinical practice.

**CRD commentary**

The review addressed a clear question and inclusion criteria were defined. An appropriate range of databases were searched, but the restriction of the review to full-text studies published in English and the use of diagnostic filter meant that the search was likely to have missed relevant studies. Appropriate steps were taken to minimise bias and errors when extracting data, but it was unclear whether such steps were taken for other stages of the review process.

Study quality was reported to have been assessed, but some important criteria for diagnostic accuracy studies were not considered and results of the assessment were not reported; therefore, the validity of the included studies was unclear. A narrative synthesis appeared appropriate given the differences between studies, but the synthesis was very limited and further attempts to synthesise results across studies and investigate reasons for the wide variation in estimates of sensitivity would have improved the review. The authors' conclusions were not supported by the results of the review, which suggested substantial variation in sensitivity, and specificity estimates were not consistently high.

Given these methodological limitations, the authors' conclusion that ankle brachial index is a useful tool to identify peripheral artery disease is unlikely to be reliable.

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

**Practice:** Although the authors made some recommendations for clinical practice these were not supported by the data.

**Research:** The authors stated that well-designed and properly controlled studies that compared the exact ankle brachial index test (≤0.90) with arteriography in general populations, elderly individuals, and those with diabetes are needed. Such studies should control for potential confounding factors.

**Funding**

Not stated.

**Bibliographic details**


**PubMedID**

20926495

**DOI**

10.1177/1358863X10378376

**Original Paper URL**

http://vmj.sagepub.com/content/15/5/361.abstract

**Indexing Status**
Subject indexing assigned by NLM

MeSH
Adult; Aged; Aged, 80 and over; Ankle Brachial Index /standards; Female; Humans; Male; Middle Aged; Peripheral Arterial Disease /diagnosis /physiopathology; Predictive Value of Tests; Prognosis; Sensitivity and Specificity; Severity of Illness Index; Young Adult

AccessionNumber
12011000996

Date bibliographic record published
13/04/2011

Date abstract record published
14/09/2011

Record Status
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.