Does this woman have osteoporosis?
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CRD summary
This review evaluated the diagnostic accuracy of physical examination for osteopenia, osteoporosis and spinal fracture. The authors concluded that several parameters could help to identify those with osteoporosis or spinal fractures, and women who would benefit from earlier screening. The conclusions of this review are likely to be reliable.

Authors' objectives
To evaluate the diagnostic accuracy and precision of physical examination for osteopenia, osteoporosis and spinal fracture.

Searching
MEDLINE was searched from 1966 to August 2004; the search terms were reported. The reference lists of retrieved articles, reviews and clinical skills textbooks were also checked. Experts in the field were contacted.

Study selection
Study designs of evaluations included in the review
There were no specific inclusion criteria relating to the study design.

Specific interventions included in the review
Studies of the accuracy or precision of physical examination or history for the diagnosis of osteopenia, osteoporosis and spinal fracture were eligible for inclusion.

Reference standard test against which the new test was compared
Studies using bone densitometry for any site, or semi-quantitative techniques or vertebral morphometry for vertebral fracture, were eligible for inclusion. The included studies used bone mineral density (BMD) and vertebral morphometry as the reference standards.

Participants included in the review
Studies of people with suspected osteopenia, osteoporosis or spinal fracture were eligible for inclusion. The participants in the included studies were mainly women, either from osteoporosis clinics or over 65 years of age.

Outcomes assessed in the review
To be included in the review, studies had to provide sufficient data to calculate likelihood ratios (LRs).

How were decisions on the relevance of primary studies made?
Two reviewers independently conducted the searches and selected studies for the review.

Assessment of study quality
The criteria used to assess validity were patient spectrum, blinding, whether all participants received the same 'gold' standard, and the number of participants. Two reviewers independently assessed validity, with any disagreements being resolved by consensus.

Data extraction
Two reviewers independently extracted the data from the included studies. Sensitivity and specificity were calculated for each study, as were positive and negative LRs (LR+ and LR-, respectively) and 95% confidence intervals (CIs). When BMD values were reported, the corresponding T-score was obtained using gender-appropriate tables provided by
the manufacturers of the densitometer used in the study.

**Methods of synthesis**

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

How were differences between studies investigated?
Study details were tabulated, with the studies grouped by diagnosis, and differences between the studies were discussed in the narrative.

**Results of the review**

Fourteen studies (n=13,815) were included in the review.

**Osteoporosis.**

One study reported an association between a height loss of more than 3 cm and low BMD (LR+ 3.2, 95% CI: 1.7, 6.1; LR- 0.4, 95% CI: 0.2, 0.7) in women with rheumatoid arthritis, whereas another study with a more diverse population showed no association between height loss and BMD.

Three studies showed that body weight was a better predictor of osteoporosis than other measures of body size. Two studies showed an association between BMD in women and a weight below 60 kg (LR+ 1.9, 95% CI: 1.8, 2.0; LR+ 3.6, 95% CI: 2.2, 5.58), while a third showed an association with a weight below 51 kg (LR+ 7.3, 95% CI: 5.0, 10.8).

One study reported an association between kyphosis and reduced BMD (LR+ 3.1, 95% CI: 1.8, 5.3). Grip strength below 60 lb was associated with a reduction in femur BMD (1 study; LR+ 1.3, 95% CI: 1.0, 1.6); grip strength below 20 kg was associated with a reduction in distal radius BMD (1 study; LR+ 1.5, 95% CI: 1.0, 2.1); and grip strength below 44 kPa was associated with a reduction in BMD of unspecified location (1 study; LR+ 1.7, 95% CI: 1.5, 1.9).

One study reported that a tooth count below 20 was associated with low BMD (LR+ 3.4, 95% CI: 1.4, 8.0). Another study showed no association between a tooth count below 22 and low BMD. There was no association between armspan-height difference or hand skin-fold thickness and BMD-diagnosed osteoporosis (1 study each).

**Spinal fracture.**

A kyphosis angle of greater than 43 degrees or a wall-occiput distance of greater than 7 cm in women was associated with thoracic fracture, while a kyphosis angle of less than 20 degrees or a wall-occiput distance of 0 cm reduced the chance of thoracic fracture (1 study). Another study, however, showed no association between wall-occiput distance and vertebral fracture.

A rib-pelvis distance of 2 fingerbreadths or less was associated with occult lumbar fractures (1 study; LR+ 3.8, 95% CI: 2.9, 5.1).

There was no association between armspan-height difference and vertebral fractures (2 studies).

Precision data available from individual studies were tabulated.

**Authors' conclusions**

No single physical examination or combination of findings was sufficient to rule in osteoporosis or spinal fracture. Low body weight, inability to place the back of the head against a wall when standing, low tooth count, self-reported humped back, and rib-pelvis distance could increase the likelihood of osteoporosis or spinal fracture and identify women who would benefit from earlier screening.
CRD commentary
The research question and inclusion criteria were clearly stated. The search for studies was limited, which may have led to publication bias. The review was restricted to studies with an appropriate reference standard. Each stage of the review was carried out in duplicate, thus reducing the potential for error and bias. The decision to combine the studies in a narrative seemed appropriate. Although precision data were presented, it was not discussed in any detail in the narrative. It did seem, however, that there was only a small amount of data available for analysis. The conclusions of this review are likely to be reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that research is needed to determine whether these parameters have similar properties in men, and whether there is an age at which men should be screened for BMD.

Bibliographic details
Green A D, Colon-Emeric C S, Bastian L, Drake M T, Lyles K W. Does this woman have osteoporosis? JAMA 2004; 292(23): 2890-2900

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http://jama.ama-assn.org/

Other publications of related interest
This additional published commentary may also be of interest. Johnell O. Review: no single physical examination sign rules in or out osteoporosis or spinal fracture. Evid Based Med 2005;10:123.

Indexing Status
Subject indexing assigned by NLM

MeSH
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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.