

What's the Best Mattress for Back Pain?

Laird Harrison | July 27, 2016

An Elusive Research Subject

Mattress makers offer a dizzying array of options. There are foam and conventional coil mattresses, combinations of these, and water beds. There are firm, medium, and soft mattresses.

Researching mattresses can stump experts, precisely because so many variables are involved. Still, orthopedists may have to face questions about these selections from their patients, particularly those wondering whether a new mattress will reduce their back pain.

It might. In one study, researchers from Oklahoma State University in Stillwater provided 59 apparently healthy people whose beds were at least 5 years old with new beds featuring medium-firm mattresses with foam-encased springs. After 28 nights, all of the study participants said they were experiencing less back pain and shoulder stiffness—and better sleep quality, comfort, and efficiency—on the new beds.^[1]

But would any new bed be better than an old one? The researchers noted that data from previous studies comparing foam with coil mattresses and water beds are mixed.^[1] So are there specific qualities that patients should look for?

Measuring Differences Between Mattresses

James DeVocht, DC, PhD, chiropractor and biomedical engineer at the Palmer Center for Chiropractic Research in Davenport, Iowa, dove into the mattress question more than a decade ago at the request of King Koil Licensing Company (Willowbrook, Illinois), which wanted to know whether measurable differences between mattresses could be found.^[2]

Dr DeVocht and his colleagues looked at two measures of mattress quality in four mattresses. First, they examined how well the mattresses distributed weight by measuring maximum pressure distribution patterns generated by volunteers lying supine on the mattress. Then they measured the degree of spinal distortion induced when the volunteers lay in the side posture position. For testing, they put all of the mattresses on a King Koil box spring.

They found lowest maximum pressure at both the thoracic and pelvic regions in the Perfect Contour Extraordinaire Dorchester (King Koil), followed by the Posturepedic Afton Plush (Sealy; Trinity, North Carolina), then the Beautyrest Calibri Firm (Simmons; Atlanta, Georgia) and the Perfect Sleeper Southdale (Serta; Hoffman Estates, Illinois).

On the other hand, they found greater distortions in the spine at the T1/T3 region in people lying on the King Koil mattress compared with all the other mattresses. At the T6/T8 region, they found the greatest distortions in people lying on the King Koil and Sealy mattresses.

"It appears that the two aims of a mattress, to exhibit low maximum pressures and little spinal distortion, may be at cross purposes," the investigators concluded. "Design features that minimize spinal distortion may maximize maximum pressure."

And it wasn't clear whether either factor—maximum pressure or spinal distortion—had health effects. "The real question is whether that makes a difference in your sleep quality," says Dr DeVocht.

Already at that time, researchers at the University of Surrey in the United Kingdom had found no associations between maximum body contact pressures at the shoulder, elbow, hip, knee, and ankle and subjective feelings of comfort. "It seems likely that subjective ratings of mattress comfort are dependent on a wider set of factors than contact pressure alone," they concluded.^[3]

But which factors?

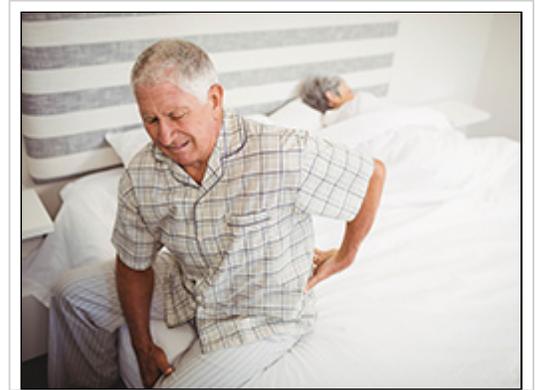
Issues of Spinal Curvature and Pressure

Researchers at the Korea Research Institute of Standard and Science in Yuseong, South Korea, got closer to an answer. They

measured study participants' spinal curvature and pressure on different mattresses, then asked the subjects to evaluate the mattresses. They found that the participants preferred mattresses on which the spinal curvature when lying down was similar to their spinal curvature when standing.^[4]

They also looked at pressure differently, examining the range of distribution of body pressure rather than maximum pressure. Participants were more comfortable when this range was narrow, the researchers found.^[4]

Using these criteria, some of the same researchers went on in a new study to test the relationship of sleep quality to these factors. They didn't just obtain measurements on the 16 study participants as the participants lay on a mattress; they kept them for 6 days and nights in a sleep laboratory. There, the researchers used electroencephalography, electromyography, electrooculographics, and sensors to measure the participants' brain waves, eye movements, chin movements, heart rhythm, and body temperature.^[5]



They found that when the participants slept on mattresses that were deemed "comfortable," on the basis of spinal curvature and distribution of pressure, their sleep efficiency and percentage of deep sleep were higher, and the percentages of time that they woke up after going to sleep were lower.

What about firmness? In a survey of orthopedic surgeons, 95% believed that mattresses played a role in the management of low back pain, and 76% recommended a firm mattress.^[6]

Researchers at the Biomechanics Institute of Valencia, Spain, looked at firmness as well. They found that "objective firmness"—as estimated from test load/deflection, as well as "average pressure," as measured using a mannequin—correlated positively with increments in perceived firmness. They also found that objective firmness and average pressure were associated with overall comfort and with reductions in difficulty in rolling. Finally, they found that people with a higher body mass index tended to be more sensitive to changes in objective firmness.^[7]

From that finding, one might conclude the firmer the mattress, the better. A group of researchers at the Kovacs Foundation in Palma de Mallorca and six other Spanish centers put that notion to the test by randomly assigning 313 adults with chronic, nonspecific low back pain to either a firm mattress or a medium-firm mattress.^[8] After 90 days, the patients with medium-firm mattresses had better outcomes for pain in bed, pain on rising, and disability than the patients with firm mattresses.

Putting these findings together, it would seem doctors should recommend mattresses that do not distort their patients' spines, distribute weight evenly, and are medium-firm in density.

Advice for Patients

Of course, few patients can bring specialized testing equipment with them to mattress stores. So it may be hard for them to know how much their spines curve and how well their weight is distributed when they lie on a mattress.

But, as the Korean team pointed out, these factors and the subjective sensation of comfort correlate. So the commonsense approach to selecting a mattress may still be the best advice.

"I would just go by what feels comfortable to me," said Dr DeVocht. "I would lie on it."

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