Hypermphosis Predicts Mortality Independent of Vertebral Osteoporosis in Older Women

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FROM ABSTRACT:
Background: Excessive kyphosis may be associated with earlier mortality, but previous studies have not controlled for clinically silent vertebral fractures, which are a known mortality risk factor.

Objective: To determine whether hyperkyphosis predicts increased mortality independent of vertebral fractures.

Design: Prospective cohort study.

Setting: Four clinical centers in Baltimore County, Maryland; Portland, Oregon; Minneapolis, Minnesota; and the Monongahela Valley, Pennsylvania.

Patients: 610 women, age 67 to 93 years, from a cohort of 9,704 women recruited from community-based listings between 1986 and 1988.

Measurements: Kyphosis was measured by using a flexicurve. Prevalent radiographic vertebral fractures at baseline were defined by morphometry, and mortality was assessed during an average follow-up of 13.5 years.

Results: In age-adjusted models, each standard deviation (SD) increase in kyphosis carried a 14% increased risk for death.

After adjustment for age and other predictors of mortality, including such osteoporosis-related factors as low bone density, moderate and severe prevalent vertebral fractures, and number of prevalent vertebral fractures, women with greater kyphosis were at increased risk for earlier death by 15%.

On stratification by prevalent vertebral fracture status, only women with prevalent fractures were at increased mortality risk from hyperkyphosis, independent of age, self-reported health, smoking, spine bone mineral density, number of vertebral fractures, and severe vertebral fractures (relative hazard per SD increase, 58% increased risk).

Conclusion: In older women with vertebral fractures, hyperkyphosis predicts an increased risk for death, independent of underlying spinal osteoporosis and the extent and severity of vertebral fractures.
KEY POINTS FROM THIS STUDY INCLUDE:

“It is well known that vertebral fractures are associated with an increased risk for death in older persons.”

Prior studies have suggested that nonosteoporotic [without fracture] kyphosis may be associated with adverse health.

“Some studies have suggested that hyperkyphosis itself may be a risk factor for death.”

In this study, kyphosis magnitude was obtained with flexicurve measurements to document the degree of thoracic curvature, known as the kyphosis index.

Osteoporotic fractures were determined by using standard guideline radiographs, interpreted by a qualified radiologist.

RESULTS

Each SD increase in kyphosis index was associated with a 14% increased risk for all-cause mortality.

Hyperkyphosis in women without vertebral fractures increased mortality rate by 9% per SD increase, which was no longer statistically significant.

In women with underlying vertebral fractures, with each SD increase in kyphosis index, the risk for death increased 50%. [Important]

DISCUSSION

“In older women with previous vertebral fractures, increased kyphosis predicts increased risk for all-cause mortality independent of the extent and severity of the underlying spinal osteoporosis.”

“Most clinicians and patients attribute their hyperkyphotic posture to underlying osteoporosis; however, our data confirm that postural changes provide important clinical predictive ability that is not provided by markers of osteoporosis alone.”

“Our results suggest that women with vertebral fractures and hyperkyphosis are at greater risk for death than women with only vertebral fractures or only hyperkyphosis.”

“Other large epidemiologic studies have demonstrated that kyphotic posture may be associated with worse health, including impaired pulmonary function, poor physical function, inferior quality of life, injurious falls, fractures, and death.”
“Our results indicate that underlying vertebral fractures are an important cause of kyphosis-associated death given that, among women without vertebral fracture, kyphosis and death were not associated.”

“Our previous work and that of others demonstrated an association between hyperkyphosis and compromised pulmonary function and pulmonary death.”

“We postulate that the phenotype of hyperkyphosis is an easily assessable clinical marker of accelerated physiologic aging or frailty.”

“Hyperkyphosis may be a good marker of at least 1 category of a frail phenotype.”

Although these authors evaluated only women, other studies have “demonstrated that hyperkyphosis affects not only older women but also men.”

“In summary, we have demonstrated that, in older women with previous vertebral fractures, independent of the number and severity of vertebral fractures, hyperkyphosis is associated with an increased risk for death.”

“These results add to a growing literature that suggests that hyperkyphosis is a clinically important finding.”

“Because it is readily observed and is associated with ill health in older persons, hyperkyphosis should be recognized as a geriatric syndrome—a ‘multifactorial health condition that occurs when the accumulated effect of impairments in multiple systems renders a person vulnerable to situational challenges.’”

KEY POINTS FROM DAN MURPHY

This study measured thoracic kyphosis, osteoporosis, and vertebral fractures in 610 elderly white women and followed their causes of death over a 13.5 year period of time.

1) In age-adjusted models, each SD increase in kyphosis carried a 14% increased risk for death.

2) Women with greater kyphosis were at increased risk for earlier death by 15%.

3) When prevalent vertebral fracture were present, increased risk for earlier death was by 58%.

4) “In older women with vertebral fractures, hyperkyphosis predicts an increased risk for death, independent of underlying spinal osteoporosis and the extent and severity of vertebral fractures.”
5) “It is well known that vertebral fractures are associated with an increased risk for death in older persons.”

6) Prior studies have suggested that nonosteoporotic [without fracture] kyphosis may be associated with adverse health.

7) “Some studies have suggested that hyperkyphosis itself may be a risk factor for death.”

8) Hyperkyphosis in women without vertebral fractures increased mortality rate by 9% per SD increase, which was no longer statistically significant.

9) In women with underlying vertebral fractures, with each SD increase in kyphosis index, the risk for death increased 50%. [Important]

10) “In older women with previous vertebral fractures, increased kyphosis predicts increased risk for all-cause mortality independent of the extent and severity of the underlying spinal osteoporosis.”

11) “Most clinicians and patients attribute their hyperkyphotic posture to underlying osteoporosis; however, our data confirm that postural changes provide important clinical predictive ability that is not provided by markers of osteoporosis alone.”

12) “Our results suggest that women with vertebral fractures and hyperkyphosis are at greater risk for death than women with only vertebral fractures or only hyperkyphosis.”

13) “Other large epidemiologic studies have demonstrated that kyphotic posture may be associated with worse health, including impaired pulmonary function, poor physical function, inferior quality of life, injurious falls, fractures, and death.”

14) “The phenotype of hyperkyphosis is an easily assessable clinical marker of accelerated physiologic aging or frailty.”

15) “Hyperkyphosis may be a good marker of at least 1 category of a frail phenotype.”

16) Although these authors evaluated only women, other studies have demonstrated that hyperkyphosis affects not only older women but also men.”

17) “In older women with previous vertebral fractures, independent of the number and severity of vertebral fractures, hyperkyphosis is associated with an increased risk for death.”
18) “These results add to a growing literature that suggests that hyperkyphosis is a clinically important finding.”

19) “Because it is readily observed and is associated with ill health in older persons, hyperkyphosis should be recognized as a geriatric syndrome—a ‘multifactorial health condition that occurs when the accumulated effect of impairments in multiple systems renders a person vulnerable to situational challenges.’”

COMMENTS FROM DAN MURPHY

Many of our patients, especially the elderly, with hyperkyphosis have undiagnosed subtle vertebral fractures that can only be documented by taking radiographs and comparing the height of the anterior and posterior vertebral bodies. The presence of both hyperkyphosis and vertebral fracture is an ominous sign, as it is associated with significant increases of all cause mortality. Deborah Kado, the primary author in this study has suggested in other studies that treatment strategies to reduce the hyperkyphosis, might change these mortality clinical outcomes. As chiropractors, this study reinforces the concept that altered posture affects systemic health, quality of life, and mortality.