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Stress Fractures in Men and Women undergoing Military Training

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The admission of women to the United States Military Academy provided us with the opportunity to study whether, under conditions of strenuous military training, stress fractures occur with equal frequency in men and women. For such a study it was essential that the women complete all training required of the traditionally all-male corps of cadets. In the summer program which we studied, boxing and wrestling were not part of the program for either men or women. All of the new cadets in the eight-week summer training period of our study participated in the following activities:

1. Daily morning runs, increasing in distance and speed until the final week. During the last week, the entire class ran four miles (6.4 kilometers) in thirty minutes daily, a pace of seven and one-half minutes per mile (4.7 minutes per kilometer).

2. Training marches, evenly distributed over the eight weeks. A total of fifty-seven miles (91.7 kilometers) and a final march of fourteen miles (22.5 kilometers) in one day, performed with a thirty-five-pound (15.8-kilogram) pack, was required of each cadet.

3. Physical training, consisting of mass athletics, calisthenics, and so forth, conducted for a total of 124 hours.

4. Close-order military drill evenly distributed over the training period, totaling thirty-two hours.

5. Field training (eleven days and ten nights).

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The average training day was sixteen and one-half hours long.

The study was conducted between July 1, 1976, and September 1, 1976, on 119 women and 1,366 men, seventeen to twenty-one years old, of whom 1,228 men and 102 women completed the course.

In this group, twenty-two fractures were incurred. None of the cadets who dropped out of the program had a stress fracture or were sufficiently symptomatic to require follow-up. There were twelve stress fractures in the 1,228 men and ten in the 102 women. The incidence represents a male-to-female ratio of twelve to one. The difference in incidence (1 per cent versus 10 per cent) is statistically significant below the 0.05 level. The anatomical distribution of the stress fractures was: metatarsal, three men and two women; calcaneus, two men and two women; fibula, two men and one woman; tibia, five men and two women; and femur, no men and three women.

There was no correlation between the time of onset of symptoms and any one type of activity. The onset of symptoms in the stress fracture, typically vague, followed the morning runs as often as the training marches, and followed physical training as often field training.

Between three and five patients per week were seen as related to the onset of symptoms, except for the first week (none) and the third and eighth weeks (one patient each). Any patient whose roentgenograms were considered normal or equivocal by any one of five qualified observers was not included in this series.