

## Progressive Back Squats Increase Bone Density

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### ABSTRACT

**INTRODUCTION:** Osteoporosis has affected over ten million people in the United States alone and 80% of those are women. Osteoporosis is a degenerative bone disease diagnosed by low bone mineral density (BMD) that has a densitometry value below one standard deviation from a specific sex and age reference value. Weight training for women is slowly becoming more popular; however, the female population is still somewhat skeptical of participating in free weight gyms. **PURPOSE:** By participating in an eleven week program of progressive back squats, the female subjects were able to learn proper techniques and benefits of one full body exercise rather than a plethora of randomized exercises in other workout regimes. By engaging in heavy lifting, bones gradually increase in thickness and strength through remodeling. **METHODS:** The volunteers for this study were premenopausal because they have the estrogen levels needed to prevent osteoclast activity while amplifying osteoblast activity and the subjects had no previous weight training experience. The subject pool consisted of 14 apparently healthy volunteers from Midwestern State University in Wichita Falls, Texas. The subjects' bone mineral densities were taken pre and post training using dual x-ray absorptiometry (DEXA) provided by United Regional Health Care Systems. During the eleven week program, a linear progression of intensity produced a consistent overload yielding adaptation. The overload principle generates an increase in intensity, frequency, or duration of the training level above what one experiences on a daily basis. The back squat was performed to overload the entire axial skeleton, and the femoral neck was measured due to its high fracture risk and because of its severity. Using a dependent sample t test, BMD was compared pre-training and post-training. **RESULTS:** Eleven out of the fourteen subjects saw an increase in BMD. Out of those eleven, one subject was categorized as "osteopenic" pre-training but was able to increase BMD back to what was classified as "normal." **DISCUSSION:** Although the sample size was small with no statistically significant results, the increases in BMD over a short duration with just one barbell exercise should be further investigated. As a result, women will be able to increase their BMD during their premenopausal years which may prevent osteoporosis in the future.

