

# Effect of training with SuperJump® on bone metabolism in women

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**Abstract:** Physical exercise is recommended to decrease bone loss in elderly women. Supejump® is a new workout activity performed on a modified elastic mini trampoline that mixes aerobic and anaerobic exercises. The aim of the study was to investigate the long-term effects of training with Supejump® on bone metabolism in women. Twelve women were involved in the study. They performed Supejump®, three times a week, each session lasting 60 mins for a total of 20-weeks. Blood samples were collected at baseline and at the end of the 20-weeks of training. The biomarkers of bone resorption (c-terminal telopeptide region of collagen type 1 ( $\beta$ -CTX)), bone formation (osteocalcin), and calcitonin, parathyroid hormone (PTH), calcium, phosphate, cortisol, total vitamin D, were analyzed. The  $\beta$ -CTX and PTH were reduced after 20 weeks of Supejump® training while calcitonin, calcium and total vitamin D were increased. These data suggest that the 20-weeks intervention had a high impact in reducing bone resorption and improving bone metabolism. In conclusion Supejump® training may be considered as a valuable intervention to prevent osteoporosis in aging because it improves bone metabolism.

**Keywords:** Bone health; women’s health; aerobic and anaerobic exercises; osteoporosis prevention

## 1. Introduction

Physical activity (PA) and nutrition are important factors to preserve health (1, 2) and affects bone metabolism. PA is now known to improve cognitive processes, counteract depression, help memory, as well as have analgesic effects (3). The adaptations induced both biochemical and physiological adaptations, depending on the type and intensity of the activity that lead to a greater demand for energy in muscle cells (4). Some researchers have suggested circuit training consisting of endurance training and resistance training. An example is represented by the Mini-trampoline circuit (MTC) modified and registered by Jill Cooper, created a new discipline called SupeJump®, an fitness activity recommended for everyone (5). Draper and collaborators showed that exercise on the mini-trampoline provides benefits to the anaerobic system by improving muscle tolerance to lactate (6); furthermore, involving the lower and upper muscle groups, it acts at the cardiovascular level by improving the redistribution of blood flow at the muscular level, as well as the lipid profile (5) and bone metabolism (7). It is interesting to note that anaerobic exercise especially lactic acid exercise has recently been reported to have a positive effect in many conditions, including pathological conditions, cerebral aging and neurodegenerative diseases (8). Starting from this knowledge, the aim of the study was to investigate the effect of SuperJump® Training at hematological and bone health level.

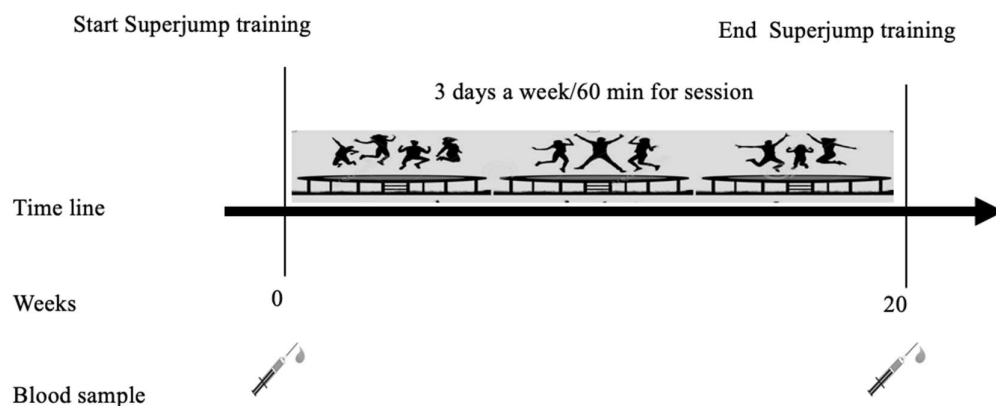
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## 2. Methods

Twelve women performed SuperJump®, three times a week, each session lasting 60 mins for 20-weeks. Blood samples were collected at baseline and at the end of the 20-weeks of training and stored to -80° C until the analysis (9).



**Figure 1.** schematic design of the study: The participants performed SuperJump® activity three times a week and each session lasting 60 mins for a total of 20-weeks.

## 3. Results and Discussion

The results for the hematological parameters analyzed before and after 20 weeks of training are listed in Table 1. Their level remained unchanged after training time.  $\beta$ -CTX and PTH were reduced, while calcitonin, calcium and total vitamin D were increased after 20 weeks of SuperJump® training suggesting that the intervention had a high impact in reducing bone resorption and improving bone metabolism.

**Table 1.** Hematological parameters.

Neutrophils	53,3 $\pm$ 8,7	53,5 $\pm$ 8,2	0,8
Lymphocytes	34,6 $\pm$ 7,6	34,7 $\pm$ 6,6	0,9
Monocytes	8,7 $\pm$ 1,9	8,3 $\pm$ 1,7	0,5
Eosinophils	2,7 $\pm$ 0,6	3,1 $\pm$ 0,4	0,3
Basophils	0,7 $\pm$ 0,3	0,7 $\pm$ 0,3	0,7
RBC	4,5 $\pm$ 0,3	4,5 $\pm$ 0,2	0,8
HGB	13,1 $\pm$ 0,8	13,1 $\pm$ 0,6	0,8
HCT	39,6 $\pm$ 2,1	39,6 $\pm$ 1,3	0,9
PLT	280,6 $\pm$ 63,8	275,4 $\pm$ 66,4	0,4

RBC, red blood cells; HGB, hemoglobin; HCT, hematocrit; WBC, white blood cells; PLT, platelets. Values are expressed as mean  $\pm$  standard deviation.

## 4. Conclusion

SuperJump® activity performed on a mini trampoline was able to reduce bone resorption and improve bone metabolism. This could be important for women that are in premenopausal or menopausal age and want to perform physical activity safely and to preserve bone health.

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