BOVINE COLOSTRUM SUPPLEMENTATION AND BONE HEALTH: A PILOT STUDY

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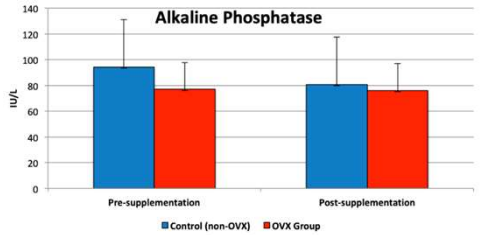
PURPOSE

Research has shown the positive effects of some bovine colostrum components in bone cells; for instance, lactoferrin is reported to stimulate osteoblast proliferation and inhibit osteoclast activity in cell cultures. However, whether bovine colostrum as a whole can induce bone mass gains in osteoporotic bones is relatively unclear. The aim of this study was to investigate the effects of bovine colostrum supplementation in ovariectomized-induced bone loss (OVX) rats.

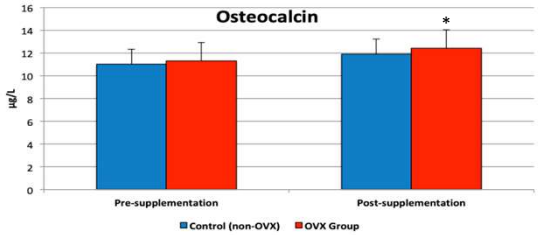
METHODS

Twenty-seven-month-old female Wister rats (n=16) were randomly assigned to the following two groups: 1) a healthy control (non-OVX) with no supplementation, and 2) a OVX with bovine colostrum supplementation (0.5g/day; oral consumption). After 5 months supplementation, bone microstructure was scanned using micro-CT (right tibia). Bone formation markers (serum: pre-and post supplementation) were analyzed (alkaline phosphatase and osteocalcin) by ECLIA. The study was approved by the National Ethics Committee for the Use of Animals in Research (ORBEA).

Graph 1. Alkaline phosphatase pre- and post-supplementation



Graph 2. Osteocalcin pre- and post-supplementation



*p<0.05, significant different after bovine colostrum supplementation (within group)

Figure 2. Project timeline

Pre-Intervention	5 Months Bovine Colostrum Supplementation	Post-Intervention
1. Bone formation and resorption markers: alkaline phosphatase, osteocalcin, deoxypyridinoline, CTX 2. Micro-CT	Colostrum dose 1 (OVX): 0.5g/day Colostrum dose 2 (OVX): 1g/day Colostrum dose 3 (OVX): 1.5g/day Control (non-OVX): no bovine colostrum supplementation Placebo (OVX)	1. Bone formation and resorption markers: alkaline phosphatase, osteocalcin, deoxypyridinoline, CTX 2. Micro-CT 3. Mechanical testing 4. Gene expression: OPG, RANKL, VEGF, FGF2

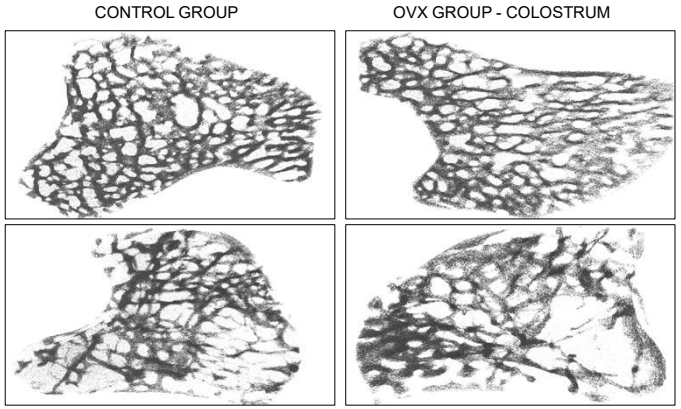


Figure 1. Micro-CT analysis (SkyScan 1272 System) after intervention

RESULTS

No significant differences were found between groups in serum alkaline phosphatase either before or after supplementation (p>0.05). Serum osteocalcin significantly increased post-supplementation in the OVX compared to pre-supplementation (pre: 11.32±1.61; post: 12.45±1.21µg/L, p<0.05), but not in the healthy control (p>0.05). Trabecular bone mineral content (BMC), trabecular thickness, cortical bone mineral density (BMD) and cortical BMC were similar between groups after supplementation (p>0.05). However, OVX group revealed significantly higher trabecular porosity (5.6%, p<0.01), trabecular separation (36.3%, p<0.01), and cortical porosity (8.0%, p<0.01) compared to the healthy control post-supplementation.

CONCLUSIONS

Bovine colostrum seems to preserve bone mass of OVX by stimulating bone formation. However, these positive effects seem not to be sufficient to restore bone micro-architecture in the OVX, possibly because the administrated dose of bovine colostrum was not sufficient for OVX to catch-up healthy rats in terms of trabecular and cortical porosity. The potential therapeutic use of bovine colostrum for osteoporosis deserves further investigation.

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