Bone mineral status of martial art practitioners compared to physically active and sedentary controls

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Introduction
It is assumed that high impact sports have favourable effect on bone health (Vuori I, 2001). The objective of this cross-sectional study was to evaluate the relationships between segmental and whole body bone mineral status and body composition parameters in martial art practitioners, as compared to physically active and sedentary controls.

Methods
Seventy volunteer male subjects, aged 20-30 years, BMI 18.4-30.6, were studied. The subjects were divided into four groups: aikido (n=10), hokutoryu jujutsu (n=20), resistance training (n=20) and sedentary control group (n=20). Total body scan was carried out by using DXA (Lunar DPX-IQ, Lunar IG Corp, Madison, Wisconsin, USA). Bone mineral density (BMD, g/cm²), bone mineral content (BMC, g) and body composition were calculated from the scan data. Food intake, physical activity and activity history were assessed by questionnaires. The participants of aikido, hokutoryu jujutsu and resistance training groups had trained their sport at least for the last 18 months. The participants of the control group had not shown any activity in the high-impact sports at least for the past 24 months.

Results
The study groups were equal in the terms of age, height, weight and BMI. Furthermore, intake of calcium and vitamin D were similar between all study groups. On the contrary, there was a significant (p<0.05) difference in the muscle mass between the hokutoryu jujutsu and control groups. Therefore, we adjusted the comparison of BMD between the groups by the muscle mass and, also, by the height and total weight. We found a statistically significant (p<0.05) difference in BMD for lumbar spine (L2-L4), femoral neck and total body, between the hokutoryu jujutsu and control groups (Figure 1). Moreover, significant (p<0.05) difference was found for BMD in lumbar spine (L2-L4) between the resistance training and control groups. No statistically significant differences were observed in BMD between the aikido and control groups, however, there was a trend suggesting that the aikido group had higher values in BMD than the control group. No statistical difference was seen in BMD between the aikido, hokutoryu jujutsu and resistance training groups. The values of the bone mineral content (BMC) showed a similar trend as BMD. In this study we also found several reduced BMD values in participants of sedentary control group.

Discussion/Conclusion
These results indicate that aikido, hokutoryu jujutsu and resistance training increases both BMD and BMC. Especially, training of hokutoryu jujutsu seems to increase bone density in lumbar spine and femoral neck. Hence, impact forces may be of greater importance in regulating bone health.

References

Fig. 1: Mean BMD with 95% confidence intervals of L2-L4, femoral neck and total body in jujutsu, aikido, strength training and control groups.