

論文の欧文要旨

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(Title)

Investigation for Resk Factors and Prevention of Low Bone Mineral Density in Female Athletes

(Abstract)

In this study, the author hypothesized that bone metabolism-related gene polymorphisms could explain differences in susceptibility to low bone mineral density (BMD) and low BMD risk factors to bone response in female athletes, and conducted cross-sectional and longitudinal study of the association between low BMD risk factors and genetic polymorphisms and BMD. In addition, author examined the effects of resistance training aimed at increasing BMD in athletes with high risk for bone disease. The main findings of this study are as follows.

In chapter 2, multiple regression analysis revealed that female athletes participating in endurance, esthetic, and aquatic sport types and a low BMI are associated with low BMD. In addition, delayed menarche may negatively affect BMD in athletes carrying the xx genotype of estrogen receptor α (*ESR1*) gene XbaI polymorphism.

In chapter 3, the multidirectional sports participants with the RR genotype of the α -actinin-3 R577X polymorphism had a higher BMD than those with the RX and RX+XX genotypes. The RR genotype was also associated with a higher maximum anaerobic power than those with the RX+XX genotypes. These results suggest that the RR genotype may confer high trainability for BMD and muscle power in collegiate female athletes participating in multidirectional sport types.

In chapter 4, annual changes in BMD in collegiate female athletes may be reduced by amenorrhea and participating in endurance, aquatic and esthetic type sports, and may be unaffected by vitamin D receptor gene ApaI, TaqI, and FokI and also *ESR1* gene pvuII and XbaI polymorphisms.

In chapter 5, 16 weeks of resistance training in female collegiate distance runners may increase total body BMD.

In conclusion, these results indicate that BMD in female athletes is associated with low BMD risk factors and genetic polymorphisms and that resistance training can be effective for increasing BMD in collegiate female distance runners.