Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2022 Jan 20;40(1):18-23.
doi: 10.3760/cma.j.cn121094-20201103-00608.

[Effects of vibration on the expression of mitochondrial fusion and fission genes and ultrastructure of skeletal muscle in rabbits]

[Article in Chinese]

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PMID: 35255556 DOI: 10.3760/cma.j.cn121094-20201103-00608

Abstract in English, Chinese

Objective: To study the effects of vibration on the expression of mitochondrial fusion and fission genes and ultrastructure of skeletal muscle in rabbits. **Methods:** Thirty-two 3.5-month-old New Zealand rabbits were randomly divided into low-intensity group, medium-intensity group, high-intensity group and control group, with 8 rabbits in each group. The rabbits in the experimental group were subjected to hind limb vibration load test for 45 days. The vibration intensity of the high intensity group was 12.26 m/s(2), the medium intensity group was 6.13 m/s(2), and the low intensity group was 3.02 m/s(2) according to the effective value of weighted acceleration[a(hw (4))] for 4 hours of equal energy frequency. The control group was exposed to noise only in the same experimental environment as the medium-intensity group. The noise levels of each group were measured during the vibration load experiment. After the test, the mRNA expression of mitochondrial fusion gene (*Mfn1/Mfn2*) and fission gene (*Fis1*, *Drp1*) by RT-PCR in the skeletal muscles were measured and the ultrastructure of the skeletal muscles were observed in high intensity group. **Results:** The mRNA expression of mitochondrial in the skeletal muscle tissues of control group, low intensity group, medium intensity group and high intensity group were *Mfn1*: 3.25±1.36, 3.85±1.90, 4.53±2.31 and 11.63±7.68; *Mfn2*: 0.68±0.25, 1.02±0.40, 0.94±0.33 and 1.40±0.45; *Fis1*: 1.05±0.62, 1.15±0.59, 1.53±1.06 and 2.46±1.51 and *Drp1*: 3.72±1.76, 2.91±1.63, 3.27±2.01 and 4.21±2.46, respectively. Compared with the control group, the expressions of *Mfn1* mRNA, *Mfn2* mRNA and *Fis1* mRNA in the high-intensity group increased significantly (P<0.05) , and the expressions of *Mfn2* mRNA in the medium-intensity group and the low-intensity group increased significantly (P<0.05) . Compared with the control group, the ultrastructure of skeletal muscle of high intensity group showed mitochondrial focal accumulation, cristae membrane damage, vacuole-like changes; Z-line irregularity of muscle fibers, and deficiency of sarcomere. **Conclusion:** Vibration must be lead to the abnormal mitochondrial morphology and structure and the disorder of energy metabolism due to the expression imbalance of mitochondrial fusion and fission genes in skeletal muscles of rabbits, which may be an important target of vibration-induced skeletal muscle injury.

Keywords: Mitochondrial fusion and fission genes; Rabbit; Skeletal muscle; Ultrastructure; Vibration.

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