Abstract

Effect of DHEA on Type I and II muscles in a focal cerebral ischemia model rat

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The purpose of this study was to determine the effect of DHEA on Type I (soleus) and II muscles (plantaris, gastrocnemius) in a focal brain ischemia model rat.

Thirty-seven male Sprague-Dawley rats with 200-250g body weights were randomly divided into four groups: CINS (cerebral ischemia + normal saline), CIDH (cerebral ischemia + DHEA), SHNS (sham + normal saline), SHDH (sham + DHEA). Both the CINS and CIDH groups were undergone a transient right middle cerebral artery occlusion operation. In the SHNS and SHDH groups, a sham
operation was done. DHEA was administered daily at a dose of 0.34mmol/kg, and normal saline was administered daily at the same dose by intraperitoneal injection for 7 days after operation. During the experimental period, body weight and diet intake were measured every morning. Muscle strength was measured on pre-op, post-op the 2nd day, and post-op the 7th day. Muscles and brain were dissected on post-op the 8th day. Cerebral infarction in the CINS and CIDH groups was identified by staining with 2% triphenyltetrazolium chloride solution for 60 minutes. The data were analyzed by Kruskal-Wallis test and Mann-Whitney U test using the SPSSWIN 9.0 program.

The results were summarized as follows;
1) The muscle weights of soleus(Type I), plantaris and gastrocnemius(Type II) in CINS group were significantly less than those of the SHNS group(p<.01). The muscle fiber cross-sectional area of the CINS group was significantly less than that of the SHNS group in Type I muscle fiber of the soleus and Type II muscle fiber of the plantaris and gastrocnemius(p<.05). The myofibrillar protein content of the CINS group was significantly less than that of the SHNS group in the left gastrocnemius and right soleus(p<.05). In the muscle strength at 40 and 45 degrees inclined plane test, the CINS group was significantly less than that of SHNS group on post-op 1 day and 7 day(p<.05).
2) The muscle weights of the soleus, plantaris and gastrocnemius except the unaffected side of the plantaris in the CIDH significantly increased compared to those of the CINS group (p<.05). The muscle fiber cross-sectional area of the CIDH group significantly increased compared to that of the CINS group in Type II muscle fiber of the plantaris and gastrocnemius (p<.05). The myofibrillar protein content of the CIDH group significantly increased compared to that of the CINS group in the left soleus (p<.05). In muscle strength at 45 degrees inclined plane test, the CIDH group significantly increased compared to that of the CINS group on post-op 7 day (p<.05).

3) There were no significant differences of the body weight on the first day of the experiment among the 4 groups. On the post-op 8 day, differences in body weight among 4 groups were significant. The body weight of the CINS group was significantly less than that of the CIDH, SHNS and SHDH groups (p<.01). Total diet intake of the CINS and CIDH groups was significantly less than that of the SHNS and SHDH groups (p<.01).

Based on these results, it was identified that muscle atrophy could be induced during the 7 days after cerebral infarction, and DHEA administration during the early stages of cerebral infarction might attenuate muscle atrophy.
Key words: DHEA, cerebral ischemia, Type I muscle, Type II muscle, muscle atrophy.

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