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The effect of resistance training, sensomotoric training and sensomotoric resistance training on strength, hypertrophy and kinesthetic sensibility of neck muscles

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Introduction: Data about the specificity of neck resistance training is limited to strength gain during flexion and extension. However, the main aspect of neck muscle performance is not to generate high forces but to maintain the balance of the head in order to optimize the perception of the sense organs that are localized in the head. Therefore the objective of this study was to investigate the effect of three different 10-week neck training programs on motoric and sensoric abilities of the neck muscles.

Materials/Methods: In a randomized clinical therapy study 36 healthy women completed one of the three neck training programs. One group performed cervical resistance training against the elastic resistance of a theraband (RT, n=13). The second group followed a visual signal in a virtual reality scene (SMT, n=10) to perform sensomotoric training. In the third group (SMRT, n=13) a kinematic training device was used for sensomotoric resistance training and movement control was achieved with the virtual reality scene. Neck strength in flexion, extension and rotation, the cross-sectional area of three different neck muscle groups, static position sense and visual motion control of the cervical spine were assessed pre- and post-intervention.

Results: The strength which was gained during the different 10-week training programs differed only significantly in mean isometric strength flexion (0.0218) and mean isometric strength extension (0.0131) between the SMRT group and the SMT group. There were no significant differences between the SMRT and RT groups. The relative increase of muscle mass in all studied muscle groups was significantly (p=0.0004 to p=0.0132) higher in the SMRT group than in the RT group. The visual motion control decreased between 35% and 42% in the RT group and improved between -19% and -24% in the SMT group. In the SMRT group, the difference was between 2% and -11%. There was no significant change in the static position sense in any of the groups.

Conclusions: The study shows that the SMRT training program leads to more neck muscle hypertrophy than the RT training program. Contrary to the subjects undergoing the RT training program, the subjects in the SMRT group showed no deterioration in the visual motion control of the cervical spine.

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