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CHANGES IN POSTURE, BALANCE AND STRENGTH PARAMETERS FOLLOWING TRAINING WITH HUBER® DEVICE IN HEALTHY SUBJECTS

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The aim of this study was to analyse the effects of training performed on a Huber® device design by LPG Systems. This device is devoted to improve posture, postural control and muscular function.

Twelve healthy adults took part in a two month training programme, three times a week on a rehabilitation device involving the whole body. Instrumental assessment of posture, postural control and muscular function was performed before and after training. The studied postural parameters which were measured in the upright position included the spine length as well as the thoracic and lumbar curvatures. Postural control was measured in different experimental conditions by a parameter of position (mean anteroposterior position of centre of foot pressure (CP)) and by two parameters of stability (length and surface of the displacement of CP). The assessment of the muscular function was performed during knee and spine extension and included maximal voluntary isometric contraction (MVIC), root mean square (RMS), neuromuscular efficiency (MVIC/RMS) as well as a measure of muscle fatigabilty of vastus lateralis and erector spinae muscles.

The Bouchard questionnaire which was completed by the subjects before the training period allowed us to split the population into sedentary and active groups. The findings showed:

- For posture, a shortening of the spine length ($p<0.05$), particularly for the sedentary group;
- For static postural control, a more forward CP position for the maximal backward inclination condition ($p<0.01$), a diminution of the length of CP displacement in eyes closed on foam condition and in the maximal forward inclination condition were observed. In this latter condition a diminished surface of the CP displacement was also notable ($p<0.01$);
- For the muscular function, an improved MVIC for knee extension was only observed in the sedentary group ($p<0.05$), a functional improvement of muscle fatigability for all the subjects.

These modifications did not show any correlation with one another ($p<0.05$). However, the value of the initial length of the CP displacement predicted its final value ($p<0.05$).

These results suggested that posture, as well as static postural control, were sensitive to training on such a rehabilitation device. However, postural control was only modified in some experimental conditions: when it was modified, it was characterised by a forward body weight transfer and enhanced stability. Muscular force was also only improved in the sedentary group. It seems likely that training on this rehabilitation device would better suit a population with an initial low physical activity level. This suggestion is confirmed by the fact that the subjects who were initially less stable in the maximal backward inclination condition and in eyes closed on foam condition obtained the greatest benefit from the training. This training could be applied to elderly or disabled people, especially those with sensory disabilities. Moreover, for healthy active or trained subjects, greater effects could be obtained by increasing exercises' intensity. Lastly, the flexibility in use of the Huber® system affords multiple solutions of exercises according to the objectives of the users.