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THE EFFECTS OF THE USAGE OF VIDEO GAME SYSTEM ON MUSCULAR RECRUITMENT

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SUMMARY

The use of virtual reality in healthcare is widely studied but scarcely practiced due to its elevated costs. Nintendo's Wii Fit serves as an inexpensive option for using virtual reality in physical therapy. There are few articles concerning this new technology and none about its effect on electric muscular activity. Both groups were assessed at the beginning and at the end of the experiment, with a surface electromyography analysis. Device used to acquire EMG data was a NORAXON Myotrace 400. The external abdominal obliques and the multifidus bilaterally muscles were assessed. EMG data were recorded during maximum contraction and during a five minutes walk. Comparison of the EMG data of the experimental group before and after intervention shows a statistically significant difference ($p < 0,05$) of the external abdominal obliques on maximum contraction test and the five minutes walk test. Data shows an increase in the right and left sides for both muscles.

INTRODUCTION

The use of virtual reality as a rehabilitation tool has been studied since the 90's by several authors. Virtual reality has many uses in treatment, such as pain management, motor control improvement in neurological patient, and cognitive processes improvement. Some authors even describe this alternative as therapeutic, pleasurable, motivating, and feasible, thus improving the patient's acceptance of treatment.

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METHODS

There were a total of thirty subjects in this study, of which ten were male and twenty female. Participants selected were all aged between twenty and thirty years old, presented no health issues in the past six months, had no history of orthopedic diseases or pain, and were sedentary. They were equally divided into a control group and an experimental

group, each containing fifteen subjects. Both groups were assessed at the beginning and at the end of the experiment, with a surface electromyography analysis. Device used to acquire EMG data was a NORAXON Myotrace 400. The external abdominal obliques and the multifidus bilaterally muscles were assessed. EMG data were recorded during maximum contraction and during a five minutes walk. After initial EMG analysis, the subjects of the control group were instructed to perform a routine of leg stretches twice a week during four weeks, and the subjects of the experimental group were submitted to a Wii Fit based protocol of exercises, also twice a week during four weeks.

RESULTS AND DISCUSSION

Comparison of the EMG data of the experimental group before and after intervention shows a statistically significant difference ($p < 0,05$) of the external abdominal obliques on maximum contraction test and the five minutes walk test. Data shows an increase in the right and left sides for both muscles. The results for the control group increase after intervention but with no statistically significant difference. And there was statistically significant difference between post-intervention data of the two groups $p < 0,05$.

Mean and standard deviations for acquired EMG data were calculated for each of the tests performed on the groups. The ANOVA test was used to compare EMG data between the two groups and between pre and post intervention results within each group. Statistical significance was set at a level of $p < 0,05$.

	Before	After	p value
Control Group Walk test	127,58	130,24	$p > 0,05$
Control Group CVM	285,22	294,35	$p > 0,05$
Experimental Group Walk test	147,14	241,56	$p < 0,05$
Experimental Group CVM	257,98	368,78	$p < 0,05$

Figure 1: Before and After EMG activation of External Abdominal. Values in RMS and microvolts unit.

CONCLUSIONS

The use of a Wii Fit based protocol of exercises twice a week during four weeks led to an increase of abdominal and multifidus muscle activity with statistically difference between the stretch and Wii Fit exercise routines. Further study is needed to determine the efficacy of Wii Fit as a therapeutic tool in physical therapy.

Wii Fit is a feasible and relatively cheap therapeutic resource that could be widely used in many rehabilitation centers and even as a tool to prescribe home-based exercises.

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