

Effectiveness of Trunk Balance Exercises and Wii Fit™ Balance Exercises in Managing Disability and Pain in Patients with Chronic Low Back Pain

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ABSTRACT

Introduction: Low back pain is a major public health problem all over the world. Many different therapeutic interventions are used in the management of low back pain. In the present study, two weeks interventions (10 sessions in all) with trunk balance exercises plus short wave diathermy plus flexibility exercises were given to 15 patients and two weeks interventions with the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises were given to another 15 patients with chronic low back pain.

Method: A total of 30 purposively selected confirmed cases of chronic low back pain aged 30-50 years were considered for the present study. The samples were collected from the DAV Institute of Physiotherapy and Rehabilitation, Jalandhar, India. The subjects were divided into two groups for intervention. Group A consisted of 15 subjects who were to perform the trunk balance exercises plus short wave diathermy plus flexibility exercises. Group B consisted of 15 subjects who were to perform the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises.

Results: Statistically significant between-group differences ($p < 0.001$) were found in ODI score and VAS score after the treatment of day-1, day-5 and day-10 in the patients treated with trunk balance exercises plus short wave diathermy plus flexibility exercises and the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises. The patients treated with the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises had the less decrement of 64.79% in ODI score as compared to 71.26% on the patients treated with trunk balance exercises plus short wave diathermy plus flexibility exercises. Whereas, in VAS score, the decrement (83.51%) was more in patient treated with the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises as compared to the decrement of 75.69% in patient treated with trunk balance exercises plus short wave diathermy plus flexibility exercises.

Conclusion: It might be concluded from the present study that, both the intervention techniques were proven equally effective for controlling disability and pain in patients with chronic low back pain.

Key Words: Chronic low back pain. Trunk balance exercises. Wii Fit™ balance exercises.

INTRODUCTION

Low back pain is a widespread public health complication. [1-4] In United States only, it affects 60% to 80% adult population at some time in their lives, and upto 50% have pain within a given year. [1-8]

In India also, the occurrence of LBP is alarmingly high; nearly 60% of the people have significant back pain at some time or the other in lives. [9] Majority of the acute low back pain disorders resolve within a 4 week period and a small number (10-40%)

become chronic. [10] Chronic low back pain is pain and disability that persists for more than three months. [11]

Chronic low back pain reduces muscle strength, endurance, flexibility and balance. Physiotherapy interventions include stretching, strengthening, core stabilization, mobilization, manipulation along with electrotherapy modalities like shortwave diathermy, ultrasound, TENS, IFT, traction and low level laser therapy can decrease pain and disability but has limitations in increasing balance and motivation for exercise programs. [12-15]

Trunk balance exercises are balance exercises focusing on restoring balance by targeting the feedback control mechanism. [16] Evidence shows that treatment programs aimed at improving trunk muscle control through core balance exercises lead to significant improvements in pain and disability in patients with chronic low back pain. [16] Hence treatment can be focused on challenging the three balance system through the trunk balance exercises. [17]

The Nintendo Wii console is an instrument of biofeedback-based exercise. As a wide range of balance impairments exists in chronic low back pain patients [17] the exercises should be targeted to improve the balance for which Wii Fit™ balance board can be used. Recently, the Nintendo Wii Fit™ exercises program has been used for its therapeutic effects on balance and visual perception by focusing on maintaining centre of balance. [18-20] Evidence proved its efficacy in improving both the mental and physical health composites in population with chronic work-related low back pain. [21]

Very few literatures are available on the effectiveness of the trunk balance exercises and the Wii Fit™ balance exercises in managing pain and disability in patients with chronic low back pain. Thus, the present study was planned.

MATERIALS AND METHODS

Subjects

The present cross-sectional study was based on purposively selected 30 confirmed cases of chronic low back pain aged 30-50 years. The samples were collected from the DAV Institute of Physiotherapy and Rehabilitation, Jalandhar, India. The subjects were divided into two groups for intervention. Group A consisted of 15 subjects who were to perform the trunk balance exercises plus short wave diathermy plus flexibility exercises. Group B consisted of 15 subjects who were to perform the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises. The study was approved by the Institutional ethics committee.

Interventions Given to Group-A

In this group, trunk balance exercises plus short wave diathermy plus flexibility exercises were given for two weeks.

Trunk Balance Exercises

Trunk Balance exercises were performed kneeling on a pillow with rotation of the trunk, head and upper limbs to 1 direction, kneeling on a pillow, moving of the upper limbs in flexion and extension, In quadruped position, extend opposite upper and lower limbs and In supine position, lift the pelvis up with one limb hip and knee extension. Each exercise was challenged by maintenance for 30 seconds hold, total of 5 minutes for each exercise plus changing the support base (couch or pillow), closing eyes and then head and limbs movements. [16]

Interventions Given to Group- B

In this group, the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises were given for two weeks.

Wii Fit™ Balance Exercises

For the Wii Fit™ balance training, the Nintendo standardized video games were used .The subjects stood on the Wii Fit™ balance board and shifted their weight in medial, lateral, anterior or posterior directions according to balance game. In soccer heading, the participants moved their head from side to side. In Ski slalom, shifted

their body weights from side to side. In Ski jump and tightrope walk, the participants performed jumps by bending and extending their knees to avoid dynamic obstacles. In penguin slide, the participants balanced their weight from side to side. All the games were played in respected order for 5 min per game. Balance games in the 1st week were- soccer heading, Ski slalom, Ski jump, tightrope walk. In 2nd week, the soccer heading was replaced with Penguin slide. [22]

Statistical Analysis

Standard descriptive statistics (mean±standard deviation) were determined for the variables. One way ANOVA was

tested after the treatment of day 1, day 5 and day 10 in the patients of both the groups, followed by Bonferroni post-hoc test. Data were analyzed using SPSS (Statistical Package for Social Science) version 20.0. A 5% level of probability was used to indicate statistical significance.

RESULTS

Table 1 showed the descriptive statistics of ODI scores in patients treated with two types of modalities. One way ANOVA showed statistically significant between-group differences ($p < 0.001$) between day-1, day-5 and day-10 in patients of both the groups.

Table 1: Descriptive statistics of ODI scores (in %) in patients treated with trunk balance exercises and Wii-Fit™ balance exercises

Conditions	Group – A (n=15)			Group – B (n=15)		
	Mean	SD	F-value	Mean	SD	F-value
Day-1	34.34	5.70	90.42***	32.80	6.64	182.62***
Day-5	19.87	8.78		19.90	6.16	
Day-10	9.87	7.02		11.55	5.04	

*** Indicates $p < 0.001$.

Table 2: Descriptive statistics of VAS score in patients treated with trunk balance exercises and Wii-Fit™ balance exercises

Conditions	Group – A (n=15)			Group – B (n=15)		
	Mean	SD	F-value	Mean	SD	F-value
DAY-1	60.60	16.73	41.93***	58.40	16.40	107.48***
DAY-5	29.17	13.97		30.87	15.82	
DAY-10	14.73	18.16		9.63	7.22	

*** Indicates $p < 0.001$.

The descriptive statistics of VAS score in patients treated with two types of modalities were shown in table 2. Statistically significant ($p < 0.001$) between-group differences were found in VAS between day-1, day-5 and day-10 in the patients treated with these two sets of modalities.

DISCUSSION

Low back pain is a major public health problems all over the world. [1-8] Numbers of different therapeutic interventions are used in managing the low back pain. For therapists, it is important to determine the most successful treatment protocol. In the present study, two weeks interventions (10 sessions in all) with trunk balance exercises plus short wave diathermy plus flexibility exercises were given to 15 patients and two weeks interventions with

the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises were given to another 15 patients with chronic low back pain. Statistically significant differences ($p < 0.001$) were found between day-1, day-5 and day-10 in the patients treated with both the sets of modalities in ODI-score (table 1) and VAS-score (table 2). In ODI-scores, patients treated with trunk balance exercises plus short wave diathermy plus flexibility exercises had the disability decrement of 71.26%, whereas, the patients treated with the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises had the disability decrement of 64.79%. So far VAS-score was concerned; patients treated with the Wii Fit™ balance exercises plus short wave diathermy plus flexibility exercises had the pain decrement of 83.51% and the patients treated with trunk balance

exercises plus short wave diathermy plus flexibility exercises had the pain decrement of 75.69%. Therefore, both the modalities were proven equally effective for the decrement of disability and pain in patients with chronic low back pain. The findings of the present study supported the findings of earlier studies of Kannabiran et al. [23] and Hosseinifar et al. [24] where the trunk balance exercises along with flexibility were reported to be effective enough in reducing pain and improving disability among chronic low back pain subjects.

In fact, trunk balance exercises would promote the recruitment of the trunk musculature which might be lost in the patients with chronic low back pain. The Wii Fit™ balance exercises are relatively new in practice. Not much reference is available regarding this protocol. It was learnt that It could be a biopsychosocial intervention as it encourages the participants to enjoy the exercises and require mental and cognitive functions. [21]

The limitations of the present study were the small sample size. More extensive study is required to validate the data.

CONCLUSION

It might be concluded from the present study that, both the intervention techniques, such as trunk balance exercises and Wii Fit™ balance exercises were proven equally effective for improving pain and disability in patients with chronic low back pain.

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