



IMPACT OF INTERACTIVE TRAINING ON CORE ENDURANCE IN YOUNG ADULTS

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ABSTRACT:

This study investigates the impact of Flashfit interactive training devices on core endurance in young adults. A randomized controlled trial was conducted with 30 participants aged 18–24 years, divided equally into control and experimental groups. The experimental group received core endurance training using FlashFit devices (ICORE, IBALL, IPUNCH, IKICK), while the control group followed conventional core strengthening exercises. Pre- and post-intervention assessments were conducted using the McGill torso endurance test battery to evaluate improvements. Results showed statistically significant improvement in the experimental group, indicating that interactive technology effectively enhances core muscle endurance. The findings support the integration of digital tools in physiotherapy to promote spinal health and prevent low back pain among young adults.

Key words — Flashfit, Core Endurance, Low Back Pain, Interactive Training, McGill Endurance Test

INTRODUCTION

Low back pain is a common health issue that affects 50–80% of adults at different stages of their lives, ranking as the foremost contributor to disability on a global level.¹ Various studies found that LBP is a very common problem among adolescents, with an incidence that is the highest in the third decade of life.² The majority, about 90%, falls under the category of nonspecific low back pain (NSLBP).⁴ Various factors can contribute to the development of LBP. One mechanism is reduced endurance and increased fatigability of the trunk muscles, which aid in stabilizing the spine.⁸ Panjabi's model of dynamic core stability describes core stabilization as the interaction of three subsystems: passive, active, and neural control. The passive subsystem (vertebrae, discs, ligaments, joint capsules, and passive muscle properties) provides end-range stability through mechanical resistance and mechanoreceptor feedback. The active subsystem (core musculature) ensures dynamic spinal and proximal limb stabilization while relaying movement information. The neural subsystem integrates these inputs to regulate stability. Sustained lumbar stability and prevention of low back pain require the coordinated function of all three, which can be enhanced through targeted exercises.^{12,13} McGill's torso endurance battery tests have been used to evaluate the isometric core endurance and have been found to be reliable.^{15,16} The holistic approach for LBP integrates pharmacological and non-pharmacological interventions. Systematic reviews have raised concern over the role of exercise, with scarce evidence supporting any specific type such as flexion/extension, abdominals strengthening, McKenzie, stretching, or Williams.^{5,6,7} One innovation is the FLASHFIT device, a contemporary technological solution designed to enhance healthcare efficiency through modern applications. The FLASHFIT interactive device serves as a high-tech tool that has the capacity to revolutionize healthcare delivery. It offers a comprehensive health monitoring solution by integrating interactive functionalities with real-time data acquisition. The system interconnects various components, including I wall, I floor, I track, I pod, I punch, I core, I ball, I jump, I station, and I cage, thereby facilitating an integrated approach to assessing both physiological and cognitive health. Primary purpose of this study: FLASHFIT is a high-tech, interactive device used to improve core endurance using real-time feedback and multifunctional components, structured exercises, and progress tracking, offering a personalized and engaging approach to reducing LBP risk and supporting spinal health.^{17,20}

METHODOLOGY

The study design is an experimental study using a randomized controlled trial. The study population includes both gender age between 18 to 24 years with a sample size of 30 young adults (14 males, 16 females) they were randomly selected and divided into two groups: the experimental group (15) and the control group (15). The subjects were fully informed about the purpose and methods of the study before participating, and written informed consent was provided voluntarily. The duration of intervention will be given for 5 days per week for 4 weeks for both groups. The study was done on a pre-test and post-test experimental study pattern. Inclusion criteria were young adults aged 18-24 years-both genders, individuals identified with low core endurance through McGill test ratios are included (3,8), young individuals without low back pain, no history of neurological or orthopedic diseases, able to perform physical exercises without restrictions. Exclusion criteria were individuals with acute/severe low back pain where core endurance tests could aggravate the pain, psychiatric illnesses (e.g., depression, mania, etc.), neurological conditions (e.g., hemiplegia, poliomyelitis), rheumatic diseases (e.g., rheumatoid arthritis, ankylosing spondylitis), individuals with severe musculoskeletal disorders, spinal surgeries, or any conditions that interfere with physical exercise, and pregnant women.

Outcome tool: McGill Torso Endurance Test Battery (Trunk flexor endurance test, Trunk lateral endurance test [right and left side bridge], Trunk extensor endurance test.).

Procedure: The intervention was conducted for both groups over a period of 4 weeks. During the first week, participants in each group performed 5 sets of exercises lasting 20 seconds each. In the second week, the duration was increased to 30 seconds per set, and in the third and fourth weeks, it was further increased to 40 seconds per set. The exercises were performed 5 days per week of 4 weeks, with a 30-second break between each set to reduce muscle fatigue.²³

Participants in the experimental group received Flashfit interactive training, while participants in the control group received conventional Core exercises (pelvic bridging, bird-dog, and prone plank exercises)

Experimental group:

Flashfit interactive training devices protocols²⁰

Devices	Patient position & procedure
I-CORE	Participants are asked to lie in crook lying position in the I-core and green color lights will flash-up and they are asked to respond to green color by coming to crook sitting position and touch the green light.
I-BALL	Participants are asked to Stand in middle of IBALL and keep watching until the light gets activated and put the ball inside the light activated hole before it diminishes, squat down to pick the ball and put again inside the light activated hole.
I-KICK	Participants are asked to Stand in front of I-KICK, all lights will light ups, kick or punch to deactivate all the lights as fast as you can.
I-PUNCH	Participants are asked to Stand in front of I-PUNCH and punch the green light target before it disappears.



Figure 1: flashfit interactive devices

RESULTS & DISCUSSION

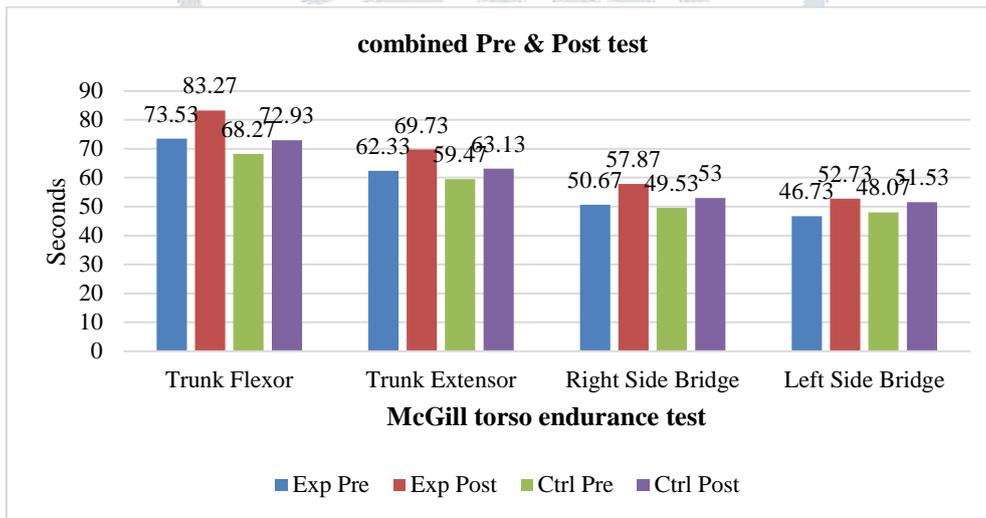
Data analysis and interpretation

Table 1: within group analysis of experimental group and control group

McGill torso endurance test	Group	Pre-Test Avg	Post-Test Avg	Mean Difference	Std. Deviation	p value
Trunk Flexor Endurance Test	Experimental Group	73.53	83.27	9.73	1.33	<0.001
Trunk Extensor Endurance Test	Experimental Group	62.33	69.73	7.4	1.24	<0.001
Trunk Right side bridge Test	Experimental Group	50.67	57.87	7.2	1.15	<0.001
Trunk Left side bridge Test	Experimental Group	46.73	52.73	6	1.41	<0.001

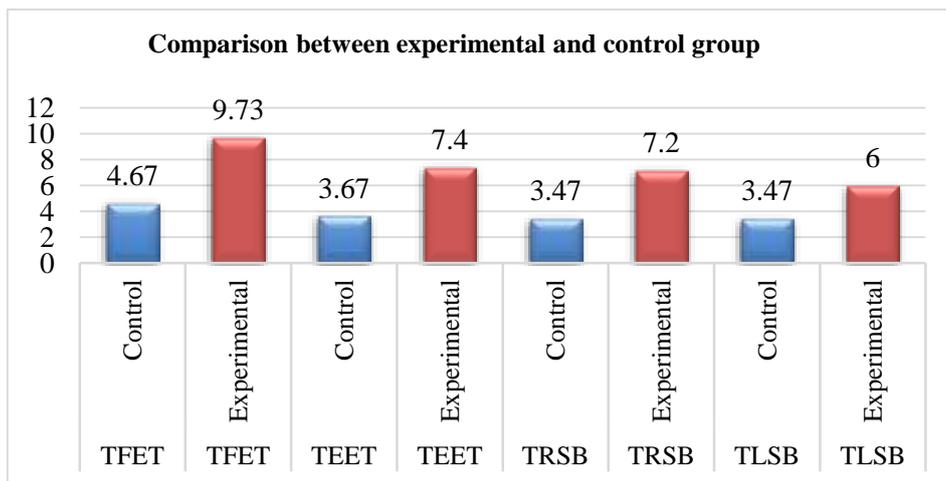
Trunk Flexor Endurance Test	Control Group	68.27	72.93	4.67	1.45	<0.001
Trunk Extensor Endurance Test	Control Group	59.47	63.13	3.67	0.98	<0.001
Trunk Right side bridge Test	Control Group	49.53	53	3.47	1.06	<0.001
Trunk Left side bridge Test	Control Group	48.07	51.53	3.47	1.19	<0.001

Here the table shows that all four McGill torso endurance test values increased after intervention given in both experimental and control groups from pre-test to post-test, with more significant improvements in the experimental group compared to the control group.



graph 1. pre- and post-test values for McGill torso muscular endurance test of experimental group & control group

Independent t-test for group comparisons:



graph 2: mean difference between experimental group and control group

RESULTS

Analysis of the McGill torso endurance test revealed significant improvements in both the experimental and control groups. Pré- and post-test data for the McGill torso endurance test were analysed using paired t-tests. Within both the experimental and control groups, these tests, demonstrated statistically significant improvements ($p < 0.05$). Further analysis, using an independent samples t-test, compared the change in McGill torso endurance test scores between the two groups. This analysis confirmed a statistically significant difference ($p < 0.05$), indicating a greater improvement in the experimental group compared to the control group.

DISCUSSION

The study aimed to evaluate the impact of interactive training using the FlashFit device on core endurance in young adults. Core endurance exercises are an integral part of LBP prevention and rehabilitation, emphasizing the importance of strengthening trunk muscles for optimal spinal stability.

The present study demonstrates that interactive training with the Flashfit device significantly improves core endurance in young adults compared to traditional core exercises. The core endurance is measured by the McGill torso endurance test. Physiologically, Flashfit's real-time, dynamic feedback stimulates the central nervous system (CNS), enhancing neural plasticity and facilitating motor learning. This neural adaptation improves communication between the brain and muscles, enhancing coordination and reaction times. Flashfit promotes better trunk stability and spinal alignment, reducing strain on the lumbar spine and minimizing the risk of low back pain (LBP).

This study highlights Flashfit's effectiveness as a smart rehabilitation tool, reshaping the future of physiotherapy. Supporting this, (Muthukrishnan et al. (2024)) found that Flashfit improved balance, reaction time, and reduced fall risk in older adults, key factors in geriatric rehabilitation. Additionally, (Kamaraj et al. (2023)) observed improvements in both physical strength and cognitive functions such as attention, mood, and communication in children with multiple disabilities.

Together, these studies confirm that Flashfit is not just a tool but an evidence-based innovation adaptable across age groups and disabilities.

CONCLUSION

The findings of this study, "Flashfit interactive training device" significantly improves core endurance in young adults compared to traditional exercises. The experimental group showed greater enhancements in trunk muscle endurance. These findings support the integration of interactive technologies like Flashfit into core training programs to promote spinal health and functional stability.

In conclusion, the findings of this study highlight the significant advancements in rehabilitation, FLASHFIT's unique ability to simultaneously target cognitive and physical domains makes it a promising tool for modern rehabilitation practices. Its comprehensive benefits provide a compelling argument for its integration into conventional therapy protocols to maximize patient outcomes.

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