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"COMPARISON BETWEEN EFFECTIVENESS NORDIC WALKING TRAINING VERSES BACKWARD WALKING TRAINING FOR IMPROVING GAIT ENDURANCE IN CHRONIC HEMIPARESIS PATIENTS"

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ABSTRACT

BACKGROUND AND OBJECTIVES: Nordic walking encourages an upright posture, enhances cardiovascular endurance, and offers a low-impact exercise option suitable for various fitness levels. Though unconventional, strolling backward through urban streets or serene parks gains popularity through a TikTok trend, praising its health merits. Hence, this study aims to compare between effectiveness of Nordic walking training verses backward walking training for improving gait endurance in chronic hemiparesis patients.

METHOD: A comparative study was designed for 30 Patients diagnosed with hemiparesis based on the inclusion and exclusion criteria the subjects were divided into 2 groups through random sampling technique Group A (Nordic Walking Training) 1hour and Group B (Backward Walking Training), 1hour. Each group had 15 subjects for the study and followed for 12 weeks, (1hour per day ,4 day in a week ,12 weeks)

RESULT: The results of this study indicated that both the groups showed significant improvement in functional activities and gait but statically the group treated with group A (Nordic Walking) was more
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KEYWORDS:

INTRODUCTION

Individuals who have suffered a stroke commonly experience hemiparesis, a condition defined by muscle weakness on one side of the body[1]. This muscle weakness is caused by impairment in central muscle activation resulting in loss of voluntary muscle force generating capacity and slowing of joint movements. As a consequence of reduced muscular activity, the proportions of fat tissue and fast twitch muscle fibers increase in the muscles of the hemiparetic side, contributing to muscular fatigability[2,3]. Furthermore, stroke results in impairments that reduce physical activity and capacity, making even low-intensity activities challenging to perform[4,5]. For any given activity, stroke survivors expend more energy and fatigue more easily. It is imperative that these individuals maintain a physically active lifestyle as they age, as it can prevent the development or exacerbation of other cardiovascular, cerebrovascular and/or metabolic diseases.

Hemiplegia is paralysis, which means you can't move or control the muscles in the affected body part. That can cause muscles that are completely limp. It can also cause spastic hemiplegia, a type of paralysis where muscles contract uncontrollably. Hemiplegia affects either the right side of your body (right hemiplegia) or the left side of your body (left hemiplegia), with your spine (backbone) being the dividing line between the two halves[5]. Hemiplegia may affect your face, arm and leg on one side of your body in various ways: The paralysis may not be present, or not be as severe in all of these three body areas. There are even some rare conditions that cause hemiplegia to come and go, affecting one or both sides of the body as it does. Depending on how and why it happens, hemiplegia may be treatable. In some cases, no treatment is necessary, while others need immediate medical care to reverse the cause of the hemiplegia.[6] Hemiplegia happens because of problems that affect your central nervous system (CNS). The two parts that make up your central nervous system are your brain and spinal cord. To understand how conditions cause hemiplegia, it helps to know a little bit about how your CNS works. Anatomy of the central nervous system A key part of how your CNS works involves a concept known as "decussation." This term comes from "debusses" the Latin word for the Roman numeral "X." Decussation means that nerves on opposite sides cross over each other (like an X) and switch sides.[7-9] Healthcare providers call this "contralateral hemiplegia," which means "opposite side paralysis." Some of the causes are the following:

* Strokes or transient ischemic attacks (TIAs).
* Aneurysms and hemorrhages inside of your brain.
* Concussions and traumatic brain injuries (TBIs).
* Spinal cord injuries.
* Injuries you experience during birth or very early childhood, causing condition likehemiplegic cerebral palsy.
* Congenital conditions (which you have when you're born) such as alternating hemiplegia of childhood.
* Facial paralysis conditions like Bell's palsy.
* Seizures and epilepsy.
* Bleeding in between your brain and its outer layers (subdural hematomas or subarachnoid haemorrhages) or between your skull and your brain's outer membrane (epidural hematomas). * Brain tumors (including cancers).
* Nervous system diseases, especially autoimmune and inflammatory conditions, such as multiple sclerosis or progressive multifocal leukoencephalopathy (PML).
* Infections that affect your nervous system, like encephalitis, meningitis or Ramsay Hunt syndrome.
* Migraine headaches (when these involve hemiplegia, they're known as hemiplegic migraines).

The treatments for hemiplegia depend on the underlying cause. Some of these conditions are treatable or even curable. Others may get better on their own. Unfortunately, many of these conditions cause permanent damage to parts of your nervous system, such as spinal cord or traumatic brain injuries. In these cases, the hemiplegia won't go away, although it may improve to some degree. Because there are so many different ways to treat hemiplegia. Hemiplegia is a key symptom of stroke, which is a life-threatening medical emergency.

When hemiplegia isn't temporary, healthcare providers often recommend rehabilitation in addition to other treatments. Rehabilitation can take place in a hospital (inpatient rehabilitation), clinic or office (outpatient rehabilitation), or at home. Rehabilitation generally includes:

* Physical therapy: Focused on leg function, standing, walking and balance.
* Occupational therapy: Focused on arm/hand function and other activities of daily life.
* Prescription of equipment, to enhance safety and the ability to function inside and outside of your home.
* Managing symptoms associated with hemiplegia, such as spasticity and depression. * Guidance and resources to address the consequences of hemiplegia, for example, returning to work or applying for disability benefits.

There sample evidence that exercise helps optimize health and the ability to function after hemiplegia. Exercising may be more challenging with hemiplegia. This is why rehabilitation therapists usually develop exercise programs adapted to a person's needs and abilities.

The walking patterns of patients with hemiplegia, primarily due to stroke. It focuses on changes in walking distance and timing, phasic patterns, joint ranges of motion during the walking cycle, ground reaction forces, joint moments of force, joint powers, energy expenditure, and muscle activation patterns. The impact of orthotic interventions on these parameters is also discussed.

A key issue noted is that the gait patterns of hemiplegic patients significantly deviate from those of healthy individuals. Despite hemiplegia's association with unilateral motor impairment, changes were observed in nearly all walking assessment parameters on both the affected and unaffected sides. This indicates that hemiplegia impacts overall gait mechanics.

Furthermore, while hemiplegia is categorized as a single diagnostic condition, there is substantial variability in gait deviations among patients.

This variability highlights the need for personalized management and treatment plans that address each patient's unique deficits. In summary, hemiplegia considerably alters walking patterns, affecting various biomechanical and physiological parameters on both sides of the body. Orthotic interventions can influence these parameters and potentially improve gait. However, due to the significant variability in gait deviations among individuals with hemiplegia, personalized treatment approaches are essential for effective management.

Restoring gait is a key objective in neurological rehabilitation, particularly for patients with hemiplegia from stroke. A thorough assessment is essential before therapy to evaluate deficits and remaining functions.

Various therapeutic procedures are available, tailored to the individual's needs, focusing on force exercise, spasticity reduction, gait symmetry, equilibrium reflexes, stepping automation, endurance training, and rhythmic movement repetition. Recently, the therapeutic spectrum has expanded to include treadmill training with partial body-weight support, locomotor pharmacotherapy, botulinum toxin injections for selective spasticity reduction, and musical biofeedback, all of which have shown success in gait restoration. Treadmill training with partial body-weight support and enforced stepping movements has proven particularly effective.

A common issue in hemiparetic gait is the spastic inversion of the foot. For mild spasticity, an ankle-foot orthosis (AFO) is suitable. In more severe cases, botulinum toxin injections into spastic leg muscles have improved gait functions. Additionally, using auditory (musical) rhythm as a pacing signal in hemiparetic stroke patients has significantly increased weightbearing stance time on the paretic side, improved stride symmetry, and normalized gait patterns. Combining and adapting these methods to the individual patient's needs is crucial for optimal results in gait restoration.

Nordic walking, originating from Finland as "sauvakävely," is fitness walking using specially designed poles. Although trekkers and skiers had used similar techniques for years, it was formally defined by Mauri Repo in the 1979 publication "Hiihdon lajiosa" ("A Part of CrossCountry Skiing Training Methodic"). The concept evolved from off-season ski-training activities using one-piece ski poles, enhancing overall fitness and walking efficiency.

Though unconventional, strolling backward through urban streets or serene parks gains popularity through a TikTok trend, praising its health merits. Advocates, including social media influencers, assert that this "retro-walking" regimen bolsters both physical fitness and cognitive acuity. While TikTok's reliability on health matters is questionable (recall laxative misuse for weight loss), backward walking garners some support from health professionals as a beneficial exercise. Nordic walking (NW) is a popular form of rehabilitation.

NW improves psychophysical condition in breast cancer (BC) survivors. This study aimed to analyze the effects of NW on functional and postural changes of the trunk in women of different ages after BC. We hypothesized that an age relationship would be found. BC survivors ($n = 39$) were stratified by age as "middle-aged" (45–59 years) or "older" (60–75 years), then randomly allocated to the training intervention. A study group (SG, $n = 19$) participated in NW and a control group (CG, $n = 20$) performed general gymnastics. The sagittal spinal curvatures and isokinetic trunk muscle endurance were recorded at two time points, pre- and post-training intervention. Significant within NW group changes ($p < 0.05$) were found for the total work (TW) and average power (AP) of trunk flexors and extensors and the upper thoracic angle in middle-aged women. In older Nordic walkers, significant increases in TW and AP of the trunk flexor muscles were observed, with a negative increase in the trunk inclination angle. In CG, no significant functional or postural changes were observed in response to general gymnastics. NW improved both functional and postural changes in middle-aged women. This study identified the limitations of NW training in older women.

NEED OF THE STUDY

This study aims to investigate the alteration in gait patterns among patients with chronic hemiparesis and explore potential corrective measures, specifically focusing on the utilization of Nordic walking and backward walking. Nordic walking involves walking with the assistance of poles, engaging the upper body in a coordinated rhythm with the lower limbs. Conversely, backward walking, as implied, entails walking in reverse, challenging balance and coordination in a unique manner.

The characteristics of Nordic walking lie in its ability to engage both the upper and lower body simultaneously, promoting a more symmetrical gait pattern. By incorporating poles, it redistributes weight and reduces load on lower extremities, potentially alleviating pressure on affected limbs in hemiplegic individuals.

Moreover, Nordic walking encourages an upright posture, enhances cardiovascular endurance, and offers a low-impact exercise option suitable for various fitness levels.Though unconventional, strolling backward through urban streets or serene parks gains popularity through a TikTok trend, praising its health merits. Advocates, including social media influencers, assert that this "retro-walking" regimen bolsters both physical fitness and cognitive acuity. While TikTok's reliability on health matters is questionable (recall laxative misuse for weight loss), backward walking garners some support from health professionals as a beneficial exercise

On the other hand, backward walking presents distinctive characteristics, primarily targeting balance and proprioception. It requires individuals to adapt to a reversed motion, stimulating different muscle groups and enhancing spatial awareness. Backward walking challenges coordination and encourages the activation of stabilizing muscles, potentially aiding in gait rehabilitation for hemiplegic patients by addressing asymmetries and compensatory movements.Nordic walking, originating from Finland as "sauvakävely," is fitness walking using specially designed poles.

Although trekkers and skiers had used similar techniques for years, it was formally defined by Mauri Repo in the 1979 publication "Hiihdon lajiosa" ("A Part of Cross-Country Skiing Training Methodic"). The concept evolved from off-season ski-training activities using onepiece ski poles, enhancing overall fitness and walking efficiency.

The application of these interventions in gait rehabilitation for chronic hemiplegia patients involves tailored protocols addressing individual needs and capabilities. Nordic walking programs may involve initial training sessions to master the technique and progressively increase intensity and duration. Similarly, backward walking protocols may start with short distances on flat surfaces, gradually advancing to more challenging terrains or incorporating additional tasks to enhance complexity

As no literature has found to compare between effectiveness of Nordic walking training verses backward walking training for gait endurance in chronic hemiparesis patients.

AIM OF THE STUDY

To compare between effectiveness of Nordic walking training verses backward walking training for improving gait endurance in chronic hemiparesis patients.

OBJECTIVE OF THE STUDY

Main objectives of this study are

- ➢ To evaluate the effectiveness of Nordic walking training for improving gain endurance in chronic hemiparesis patients.
- ➢ To evaluate the effectiveness of backward walking training for improving gait endurance in chronic hemiparesis patients.
- ➢ To compare the effectiveness between Nordic walking training verses backward walking training for improving gait endurance in chronic hemiparesis patients.

HYPOTHESIS

NULL HYPOTHESIS:

There is no significant difference between effectiveness of Nordic walking training verses backward walking training for improving gait endurance in chronic Hemiplegia patients.

ALTERNATE HYPOTHESIS:

There is significant difference between effectiveness of Nordic walking training verses backward walking training for improving gait endurance in chronic Hemiplegia patients.

METHODOLOGY

Study Design: Comparative

Sample Design: Random Sampling

Sample Size: 30 Patients diagnosed with hemiparesis

Duration of Study: 1hour per day ,4 day in a week ,12 weeks

Study Centre: OPD of department of physiotherapy

INCLUSION CRITERIA :

- ➢ Patients diagnosis with chronic hemiparesis.
- ➢ Both male and female patients.
- ➢ Age group between 40 -60 years old.

EXCLUSION CRITERIA:

- Any other cardio vascular disorders
- Any other neurological disorders
- Any other metabolic disorders
- Bed ridden patients
- Cardiac conditions
- Confused and disoriented patients

- Malignancy
- In cooperative patients
- Any other serious diseases

OUTCOME MEASURES

BARTHEL INDEX

The Barthel Index is a scale used to measure a person's ability to perform activities of daily living (ADLs). Here's a detailed overview of the scale, including the scoring system for each activity:

Barthel Index Scale

Activity	Score	Description
Feeding	0–10	0: Needs help; 5: Needs assistance; 10: Independent
Bathing	0-5	0: Needs help; 2: Needs assistance; 5: Independent
Grooming	0–5	0: Needs help; 2: Needs assistance; 5: Independent
Dressing	0–10	0: Needs help; 5: Needs assistance; 10: Independent
Bowel Control	0–10	0: Incontinent; 5: Occasional accidents; 10: Continent
Bladder Control	0–10	0: Incontinent; 5: Occasional accidents; 10: Continent
Toilet Use	0–5	0: Needs help; 2: Needs assistance; 5: Independent
Transfers	0–15	0: Needs help; 5: Needs assistance; 10: Independent; 15: Moves independently
Mobility	0–15	0: Unable to walk; 5: Wheelchair; 10: 50 meters with assistance; 15: Independent
Stairs	0–10	0: Unable; 5: Needs assistance; 10: Independent

Total Score

Range: 0 to 100

- **0-20**: Completely dependent
- **21-60**: Substantially dependent
- **61-90**: Mildly dependent
- **91-100**: Independent

Use in Clinical Settings

- **Assessment**: Provides a comprehensive overview of a patient's functional status.
- **Progress Tracking**: Regular assessments can help monitor improvements over time. **Goal Setting**: Helps in creating personalized rehabilitation goals.

Interpretation

- Higher scores indicate greater independence in daily activities.
- Clinicians can use scores to inform treatment plans and discharge decisions.

6 MINUTE WALK TEST

The 6-Minute Walk Test (6MWT) is a simple, practical assessment used to evaluate the endurance and functional capacity of individuals, particularly those with cardiovascular, pulmonary, or musculoskeletal conditions. Here's an overview of the test:

Purpose:

- **Endurance Measurement**: Assesses the distance a person can walk in six minutes, reflecting their aerobic capacity and endurance.
- **Functional Assessment**: Helps evaluate the impact of various medical conditions on mobility and daily functioning.

Procedure:

1. **Preparation**:
   - o Ensure a flat, straight, and unobstructed 30-meter (or 100-foot) walking path. o Inform the participant about the purpose of the test and provide instructions.
   - o Allow the participant to warm up if necessary.
2. **Test Execution**:
   - o Start the timer and instruct the participant to walk as far as possible in six minutes.
   - o Encourage them to maintain a steady pace and remind them that they can rest if needed, but the clock continues to run.
   - o Record the total distance walked at the end of six minutes.
3. **Monitoring**:
   - o Observe for any signs of distress, fatigue, or the need for rest. o Note any breaks taken and their duration.

Scoring

- **Distance Walked**: Measured in meters or feet.
- **Interpretation**: Compare results against normative data for the specific population or condition. Lower distances may indicate decreased functional capacity or endurance.

Applications

- **Clinical Settings**: Used in hospitals, rehabilitation centers, and outpatient clinics.
- **Research**: Commonly employed in clinical trials to assess the efficacy of treatments.
- **Chronic Conditions**: Useful for patients with heart disease, chronic obstructive pulmonary disease (COPD), stroke, and more.

Benefits

- **Simple and Quick**: Easy to administer with minimal equipment.
- **No Special Training Required**: Can be performed by various healthcare providers.
- **Patient-Centered**: Reflects the individual's functional abilities in real-world scenarios.

Considerations

- Ensure safety measures are in place, particularly for patients with significant mobility issues or cardiovascular conditions.
- Interpretation of results should consider the patient's overall health, age, and specific diagnosis.

MATERIALS TO BE USED

- Treatment Couch
- Written consent form
- Journal assessment form
- Cane
- Marker
- Stop watch
- Measuring tape

- Pan
- Pencil
- pillow
- Papper

PROCEDURE

After collecting the written consent form the patients or the attender they were selected by inclusion and exclusion criteria they would be divided into two groups- group A (n=15 Nordic walking) and group B(n=15 Backward walking) for 50 minutes.

Total durations of 60 Minutes of treatment session for 4 days per weeks for total 12 weeks.

All the pre and post data of outcome measures would be kept safely for analysing.

Both the groups were taught about warm up and cool down exercise before and after the sessions for 5 minutes each.

Warm up exercise 5 minutes

1. Marching 60 seconds - 2repetitions

2. Side toe touch and Arm raise - 60 seconds - 2 repetitions

3. High Knee Lift - 60 seconds - 2 repetitions

Cool down exercise 5 minutes

1. Side Hip Stretch (for the both hips) 30 sec

2. Shoulder Stretch - 30 sec per arm

3. Triceps stretch - 30 sec per arm

The training protocol for **GROUP A** – Nordic Walk was designed as:

1. Preparation of the patient: Patient is asked to wear comfortable clothing which doesn't restrict their walking and wear comfortable shoes and instructed to take rest whenever they feel discomfort and take breaks during walking.

- **Poles:** Use specially designed poles with straps for comfortable gripping.
- **Posture:** Maintain an upright posture with a slight forward lean when going uphill.

2. Basic Technique:

- **Arm Swing:** Patients are instructed to swing their arms like a pendulum, as much as they can keeping the poles behind them as they walk.
- **Pole Placement:** Plant the poles slightly behind them, not in front, allowing them to push off and propel themselves forward.
- **Rhythm:** they have to maintain a steady rhythm, taking medium paces rather than long strides.
- **Grip:** Hold the poles loosely, allowing for a smooth and natural swing.

3. Specific Techniques:

- **Uphill Walking:** They have to lean slightly forward, keep strides shorter, and use poles closer to their body for maximum power and stability.
- **Downhill Walking:** They have to use poles to control speed and maintain balance.
- **Longer Distances:** They are instructed to start with shorter walks and gradually increase the duration and intensity as they become more comfortable.

Instructions given to Patients during walking are as follows :

- Shoulders are relaxed and down

- Poles are held close to the body
- The hands are opened slightly to allow the poles to swing forward—the poles are not gripped but swing from the wrist straps.
- The leading foot strikes the ground
- The opposite arm swings forward to waist height
- The opposite pole strikes the ground level with the heel of the opposite foot
- The poles remain pointing diagonally backward, they are never in front of the body
- Push the pole as far back as possible, the arm straightening to form a continuous line with the fully extended arm, the hand opening off the grip by the end of the arm swing
- The foot rolls through the step to push off with the toe. This lengthens the stride behind the body, getting the most out of each stride
- The arm motion is loose and relaxed
- Keeping the arms relaxed and keeping the poles behind the body are key elements in the proper technique.

The training protocol for **GROUP B**– Backward Walk was designed as:

1. **Preparation of the patient:** Patient is asked to wear comfortable clothing which doesn't restrict their walking and wear comfortable shoes and instructed to take rest whenever they feel discomfort and take breaks during walking.

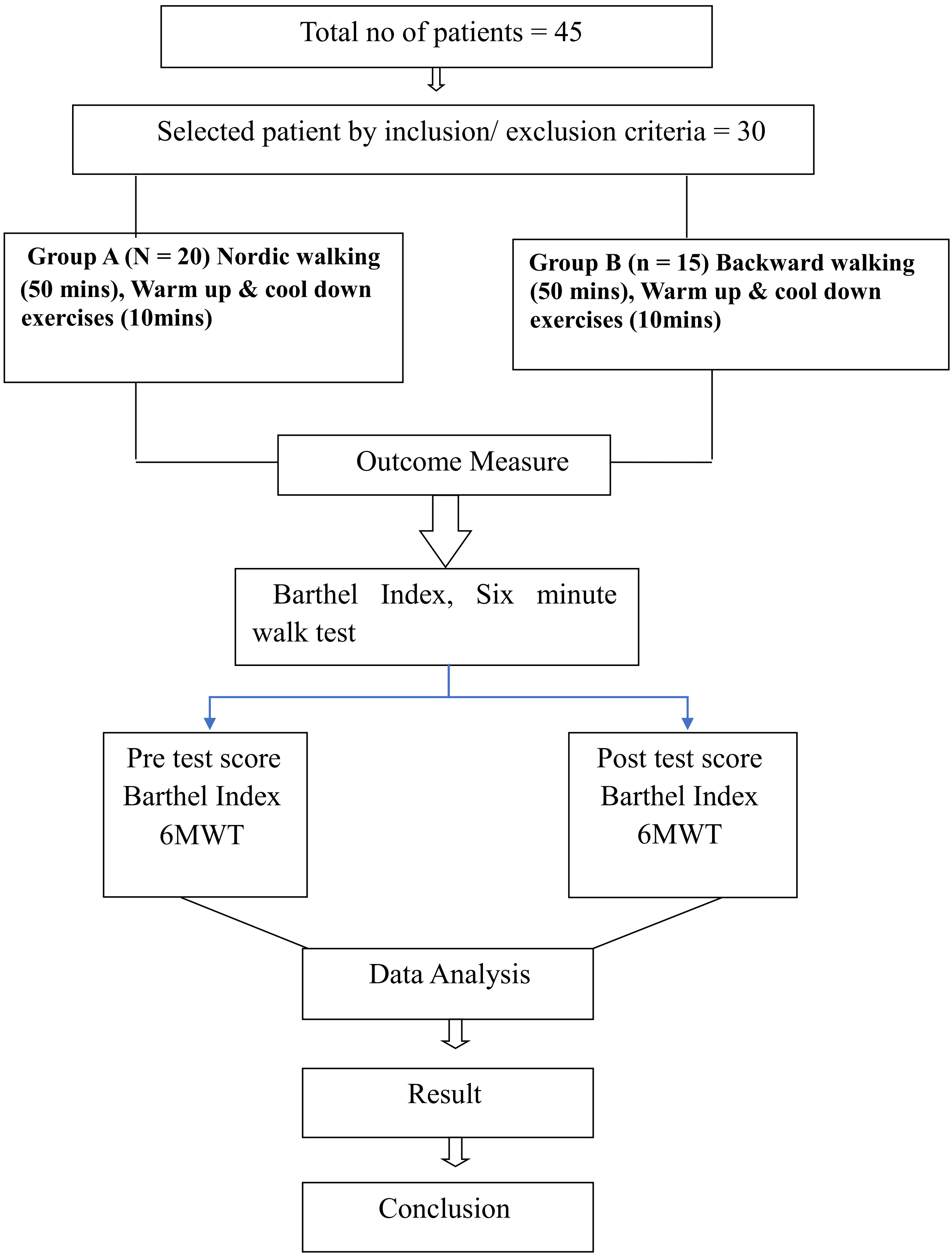
a. **Start slowly:** They have to begin with short distances, and gradually increase their distance as they become more comfortable.

b. **Maintain proper posture:** they have to keep their back straight as much as possible and be aware of their surroundings to avoid tripping.

c. Therapist uses a spotter (optional) if needed

2. **Reach back:** With each step, they have reach back with the same arm as the leg that's stepping back.
3. They have to keep shoulders and chest upright as much as possible : Avoid leaning over.
4. **Focus on toes first:** They are instructed to start with toes making contact with the ground, then roll onto heel.
5. Then instructed to gradually increase distance and pace:
6. Over time, the patient can increase their distance and speed

FLOW CHART



Data Analysis

Pre and post score of outcome measure of Barthel Index and six minute walk test was analyzed with statistical package SPSS 16. Mean, Standard deviation, Paired 't' test and Unpaired 't'test was analysed with variables.

RESULTS

TABLE: 1 DEMOGRAPHIC PRESENTATION OF DATA IN GROUPS:

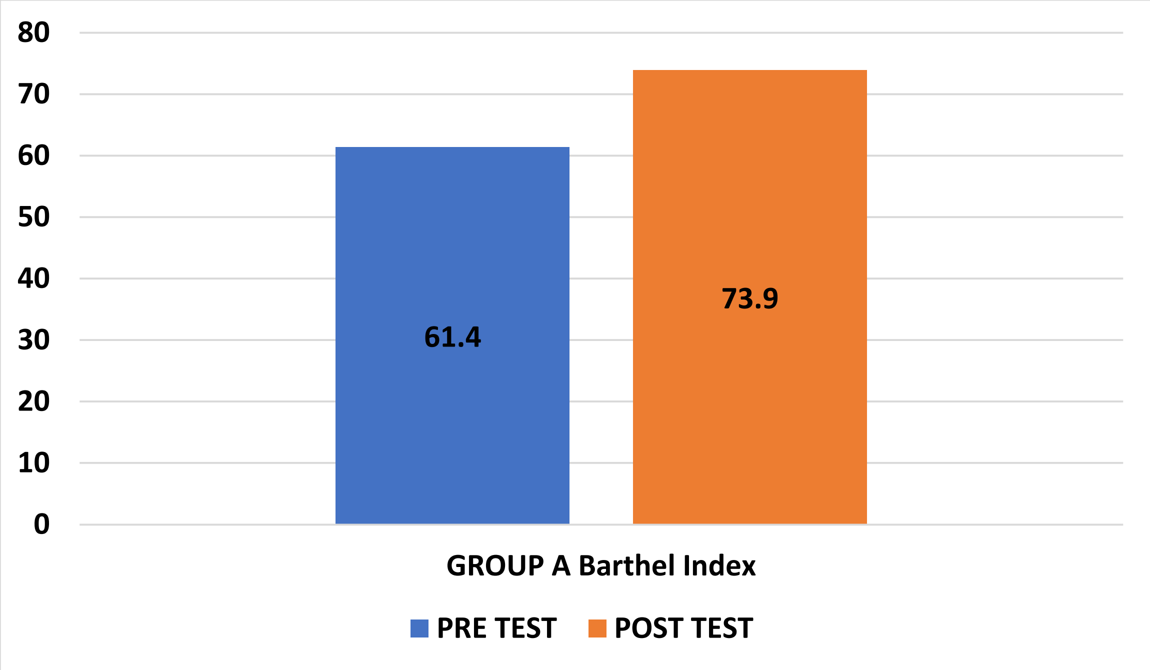
GROUPS	NUMBER	AGE IN YEARS	
		MEAN	SD
Group A	15	56	4.21
Group B	15	53	3.43
Total	30		

INTERPRETATION: The above table shows the mean age of group A and Group B were 56 and 53 respectively.

TABLE 2: ANALYSES OF PRE-TEST AND POST-TEST VALUES BARTHEL INDEX WITHIN GROUP A

BARTHEL INDEX	N	Mean	SD	Std. Error Mean	Mean Diff	df	t value	P
Pre-test	15	61.4	4.32	1.12	12.5	14	8.320	*
Post-test	15	73.9	2.88	0.78				

GRAPH 1: ANALYSES OF PRE-TEST AND POST-TEST VALUES BARTHEL INDEX WITHIN GROUP A



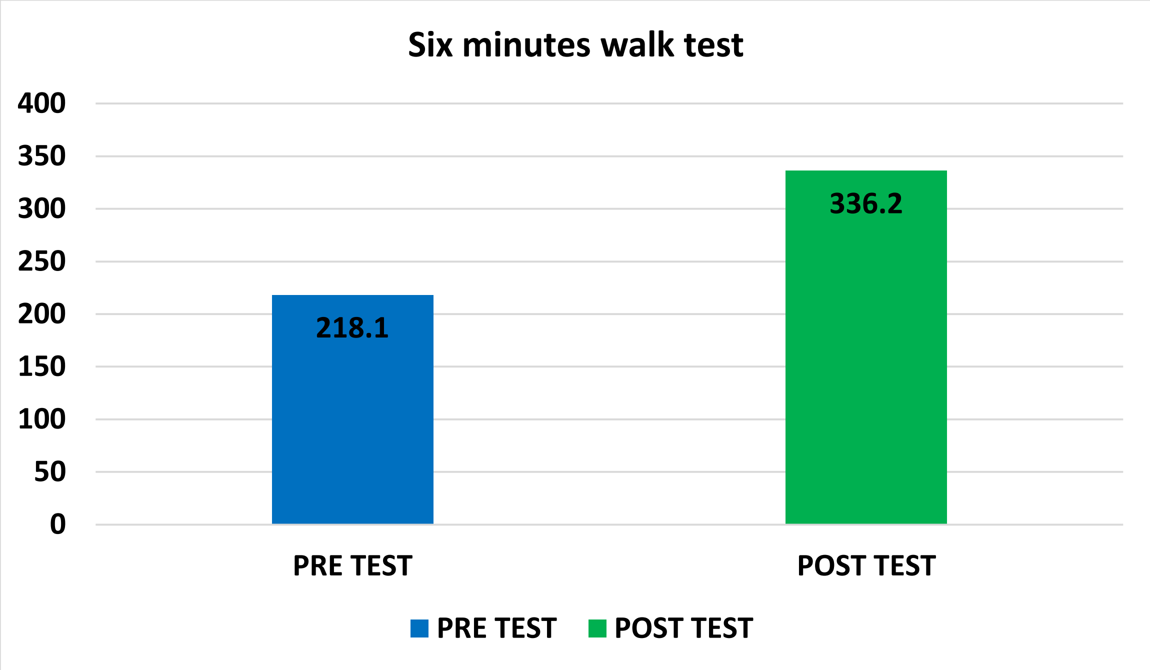
INTERPRETATION:

The above table & graph shows the mean of pre-test and post–test values of Barthel Index for Group A were

TABLE 3: ANALYSES OF PRE-TEST AND POST-TEST VALUES 6MWT WITHIN GROUP A

6MWT	N	Mean	SD	Std. Error Mean	Mean Diff	df	t value	P
Pre-test	15	218.1	11.74	3.03	118.1	14	16.561	*
Post-test	15	336.2	27.38	7.07				

GRAPH 2: ANALYSES OF PRE-TEST AND POST-TEST VALUES 6MWT WITHIN GROUP A



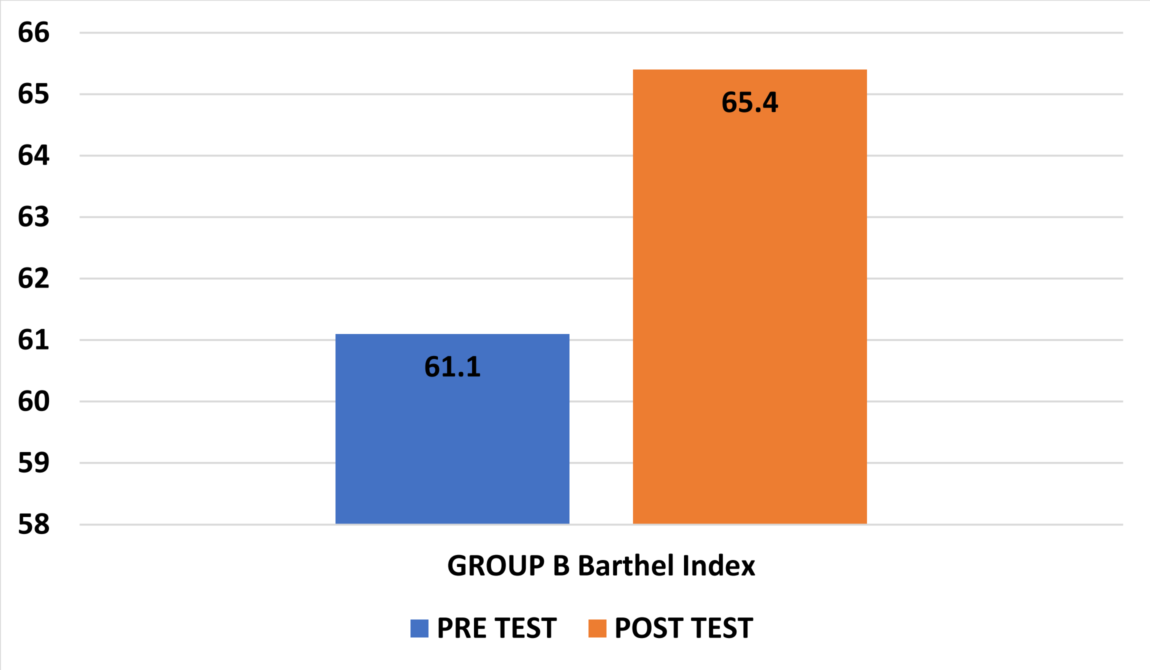
INTERPRETATION:

The above table & graph shows the mean of pre-test and post–test values of 6MWT for Group A were 218.1 and 336.2 respectively. The mean diff is 118.1 and 't' value is 16.561 and 'p' value less than 0.05%

TABLE 4: ANALYSES OF PRE-TEST AND POST-TEST VALUES BARTHEL INDEX WITHIN GROUP B

BARTHEL INDEX	N	Mean	SD	Std. Error Mean	Mean Diff	df	t value	P
Pre-test	15	61.1	4.91	1.27	4.3	14	4.790	*
Post-test	15	65.4	5.29	1.37				

GRAPH 3: ANALYSES OF PRE-TEST AND POST-TEST VALUES BARTHEL INDEX WITHIN GROUP B



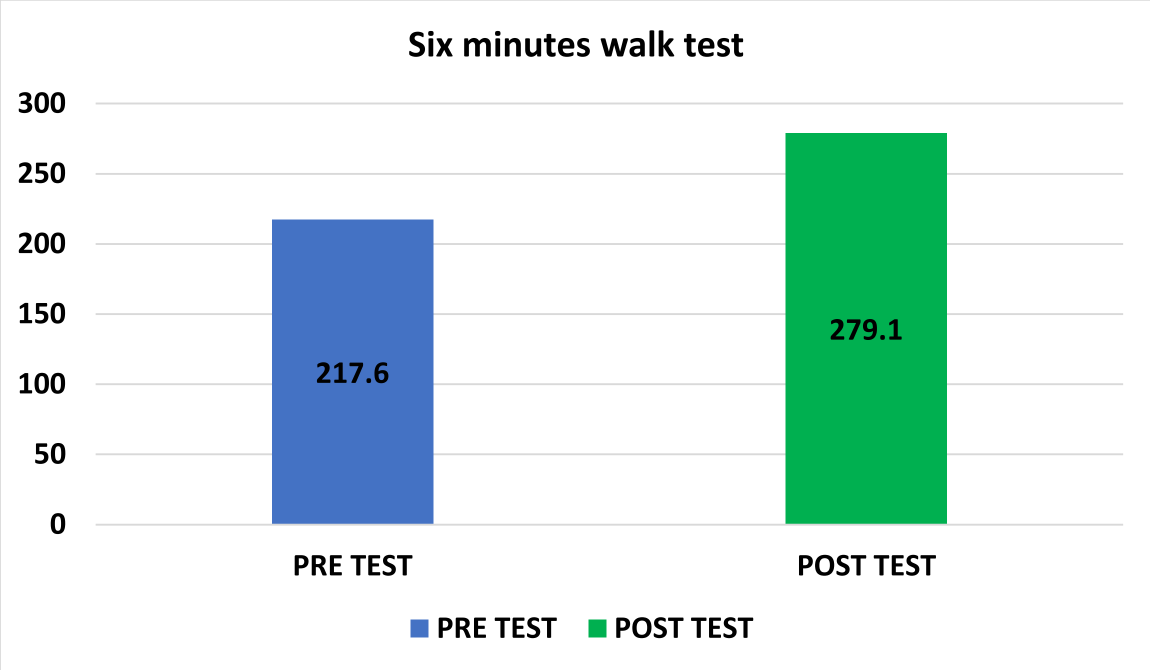
INTERPRETATION:

The above table & graph shows the mean of pre-test and post–test values of Barthel Index for Group B were 61.1 and 65.4 respectively. The mean diff is 4.3 and 't' value is 4.790 and 'p' value less than 0.05%

TABLE 5: ANALYSES OF PRE-TEST AND POST-TEST VALUES 6MWT WITHIN GROUP B

6MWT	N	Mean	SD	Std. Error Mean	Mean Diff	df	t value	P
Pre-test	15	217.6	10.58	2.73	61.5	14	16.560	*
Post-test	15	279.1	28.38	7.33				

GRAPH 4: ANALYSES OF PRE-TEST AND POST-TEST VALUES 6MWT WITHIN GROUP B



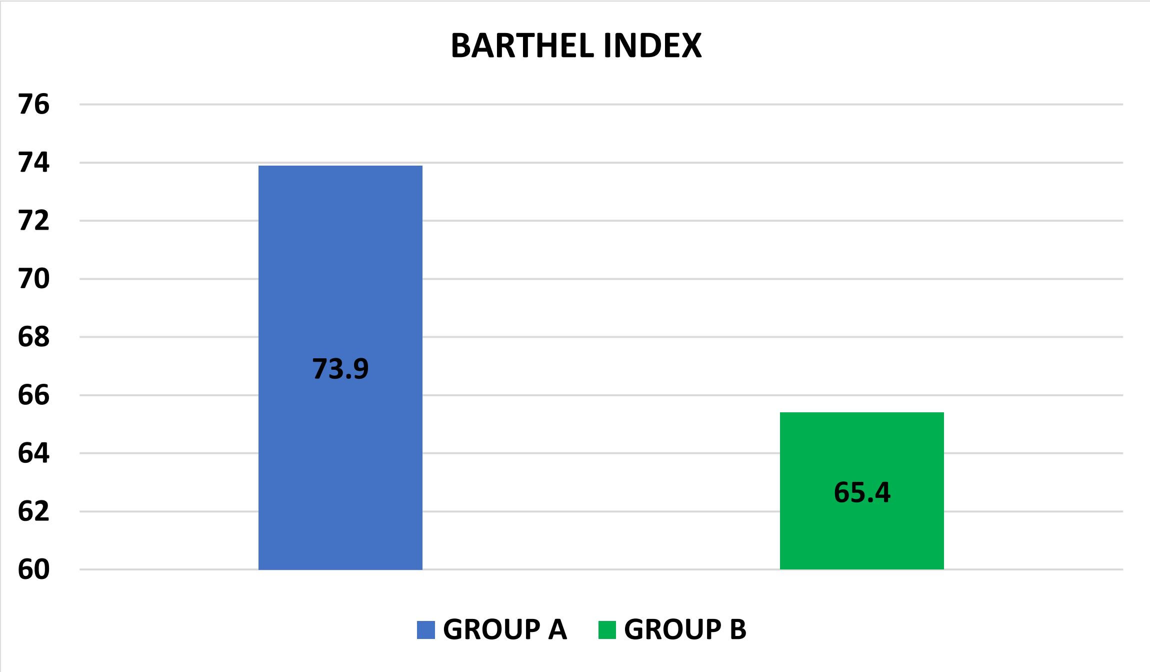
INTERPRETATION:

The above table & graph shows the mean of pre-test and post–test values of 6MWT for Group B were 217.6 and 279.1respectively. The mean diff is 61.5 and 't' value is 16.560 and 'p' value less than 0.05%

TABLE 6: ANALYSES OF POST-TEST VALUES OF BARTHEL INDEX BETWEEN GROUP A AND GROUP B

BARTHEL INDEX	N	Mean	SD	Std. Error Mean	Mean Diff	df	t value	P
GROUP A	15	73.9	2.88	0.78	8.5	14	9.356	*
GROUP B	15	65.4	5.29	1.37				

GRAPH 5: ANALYSES OF POST-TEST VALUES OF BARTHEL INDEX BETWEEN GROUP A AND GROUP B



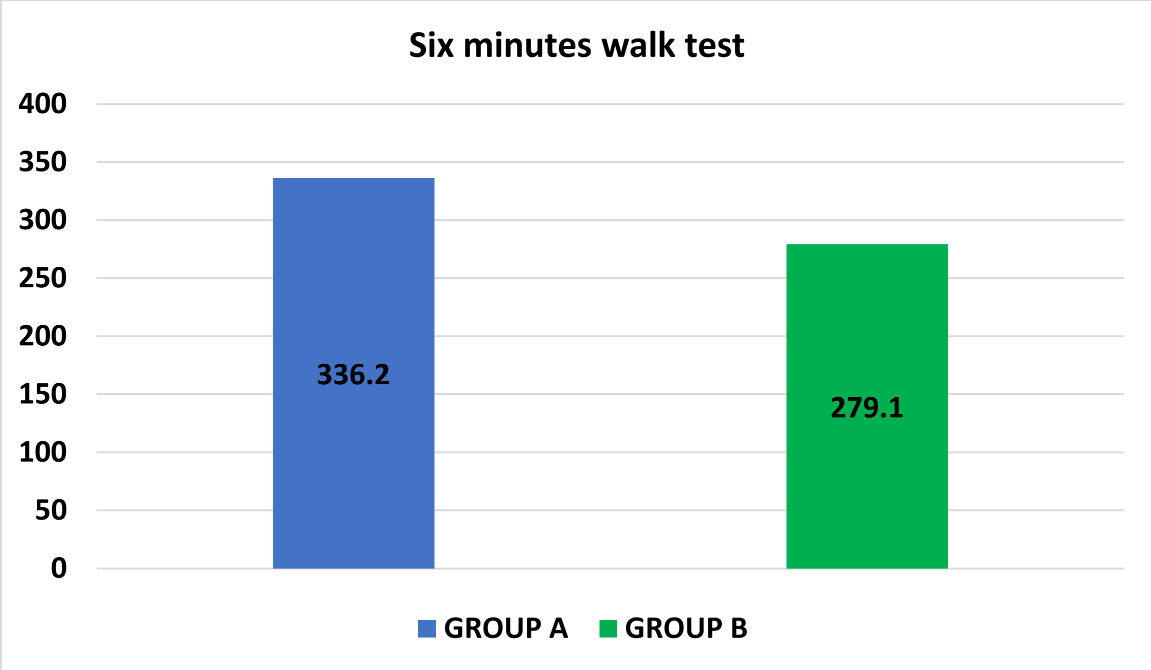
INTERPRETATION:

The above table & graph shows the mean of post–test values of Barthel Index between Group A and Group B were for Group B were 73.9 and 65.4 respectively. The mean diff is 8.5 and 't' value is 9.356 and 'p' value less than 0.05%

TABLE 7: ANALYSES OF POST-TEST VALUES OF 6MWT BETWEEN GROUP A AND GROUP B

6MWT	N	Mean	SD	Std. Error Mean	Mean Diff	df	t value	P
GROUP A	15	336.2	27.38	7.07	57.1	14	21.320	*
GROUP B	15	279.1	28.38	7.33				

GRAPH 6: ANALYSES OF POST-TEST VALUES OF 6MWT BETWEEN GROUP A AND GROUP B



INTERPRETATION:

The above table & graph shows the mean of post–test values of 6MWT between Group A and Group B were 336.2 and 279.1 respectively. The mean diff is 57.1 and 't' value is 21.320 and 'p' value less than 0.05%

DISCUSSION:

"the effectiveness of Nordic walking versus backward walking training for improving gait endurance in chronic hemiparesis patients"

In this study both the groups (group A and group B) patients had shown significant improvement in gait endur

The mechanism of balance problems have been associated with the poor prognosis of increased risk of falls, mobility and activities of daily living (ADL) in stroke. Gait in stroke patients is characterized by reduced stride and step length, increased stance periods of the nonaffected side and changed swing phase periods; wide base of support[7,8] and ambulatory dysfunction leads to disability and limited ADL.[9]

To walk normally, the head, upper limb, and trunk should be moving forward through rhythmical and alternative movement of both sides. To maintain gait, increasing the repetitive performance of a step at the same time is important to restore the symmetry of the body.[9] However, hemiplegic patients show imbalanced gait caused by limited upper limb movement and asymmetric lower limb movement.[10] Therefore, many therapeutic protocols have focused on improving balance, walking ability, and ADL in hemiplegic patients. There are a variety of training approaches for improving balance and gait performance in stroke patients. Methods for improving balance ability are mechanical balance training, multisensory training, task-specific exercise, and trunk exercise.[11, 12, 13, 14] Also, methods for improving gait include neurodevelopment treatment, task-oriented training, virtual reality training, use of treadmill, and Nordic walking training.[15, 16, 17, 18, 19]

Treadmill training (TT) has been used to improve balance and gait in stroke patients as a common therapeutic approach in clinics.[20-26]

Recently, studies investigated the effect of Nordic walking training for neurologically impaired patients and geriatric rehabilitation was reported.[19, 27] Figueiredo et al[19] compared Nordic walking and usual overground walking to estimate the walking capacity in seniors, and showed that Nordic walking was 106% more effective than overground walking in improving gait speed. Reuter et al[27] compared the effects of a flexibility and relaxation program, walking, and Nordic walking on 90 patients with Parkinson disease and found that Nordic walking is superior to the other methods in improving postural stability, stride length, and gait pattern and gait variability. Reuter et al's study reported that Nordic walking improved gait ability and postural stability. Nordic walking training involved stronger upper body movements than normal walking.[28, 29] Also, the upper body muscles can be activated with the used of poles, and the length of each step can be increased, leading to faster gait[30, 31] In general, given that upper extremity movement is a very important factor that coordinates the whole aspect of gait movement, upper extremity movements were not emphasized enough during gait training intervention of patients with stroke. In addition, traditionally, Nordic walking training has been conducted on land to promote gait ability in elderly populations and in patients with Parkinson's disease[19, 27]; however, the effects of Nordic walking implemented on the treadmill on balance and gait in participants with stroke were not determined. Training on the treadmill has a benefit of enforcing appropriate timing between the lower limbs and ensures that the hips are extended during Backward walking is an intervention that may be valuable for enhancing balance and self-efficacy to improve mobility function after stroke. It has been used in orthopedic rehabilitation as it produces less mechanical strain on the knee joint[16] while backward running is an effective means for increasing strength and power of the quadriceps.[17] Backward walking to improve gait and dynamic balance poststroke is a more recent application[18–21] and appears to offer a number of potential benefits.

Individuals poststroke fall not only during forward steady-state walking but also when turning or during a transfer,[22,23] both of which often require a backward step. A benefit of backward walking training is that it challenges postural stability requisite for such tasks. Straube et al[24] trained individuals poststroke in variable stepping contexts (sideways, backward) and reported subsequent improvements in dynamic balance activities. They contrast these balance improvements following variable step training to studies of forward walking alone that resulted in nonsignificant balance gains[25] and suggest that postural stability is not sufficiently challenged during forward walking training. During backward walking, visual cues, although present,[26] do not provide information on the target to be reached, nor the resources to anticipate ground conditions. This variation in optic flow as well as the simple novelty of the task leads to alterations in spine and pelvis stabilization to maintain dynamic balance.[27] Therefore, backward walking training, due to its greater postural demands,[28] may be superior to a more traditional forward walking training to improve gait and dynamic balance and decrease fall incidence in individuals poststroke.

A second benefit is that it engages cerebral pathways that are damaged by stroke, potentially enhancing neuroplastic recovery. Compared with forward walking, backward walking is more effective at inducing cerebral activation.[29,30] An increased oxygenated hemoglobin response during backward compared with forward walking in healthy adults, consistent with increased cortical processing, was observed in the supplementary motor area, primary motor cortex, and superior parietal lobule.[30] During backward walking, the absence of peripheral visual feedback and visual flow that is used to plan movement during forward gait is absent.[31] Lack of visual information may require a reweighting of sensory feedback to control the stepping pattern.[30] This reweighting process, with greater reliance on other feedback systems, in turn may require additional cortical resources to evaluate the sensory feedback that is available. Given the known role of novelty and task challenge in promoting neuroplasticity,[32] backward walking, a more novel motor skill relative to walking forward, may promote cortical neural plasticity by more intensely engaging the circuits damaged by stroke.

Third, backward walking allows patients to practice coordinated locomotion independent of the abnormal compensatory movement patterns that are characteristic of forward walking after stroke. In healthy adults, mean electromyographic activity is generally higher in backward than in forward walking. For example, concentric activation of hip extensor/knee flexor muscles is greater during early swing phase when walking backward.[16,33] Training under conditions with a greater demand for muscle activation may facilitate activity in muscles weakened secondary to stroke and be beneficial for improving lower limb coordination. An advantage of training backward walking poststroke is that a backward step requires hip extension with knee flexion to bring the lower extremity posterior to the trunk. This movement combination is often difficult due to the emergence of the predominant flexion synergy[34] that occurs following central nervous system damage. Repetitive backward stepping deviates from the predominant flexor synergy pattern and may improve muscle activation and subsequent motor control. These benefits are likely to transfer to improved muscle activation and appropriate kinematics during forward walking. Given these potential benefits of backward walking, we conducted a pilot study to first investigate the feasibility of applying this novel intervention early poststroke and then evaluate its effectiveness in improving gait and balance the stance phase.[15]

CONCLUSION

LIMITATION OF THE STUDY:

1. Sample size was small
2. Study was limited only with chronic stroke
3. Only motor scale and six minute walk test was assessed

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