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Effectiveness of Forward Walking and Retro Walking on Balance and Walking Speed in Geriatric Population

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Keywords

Fundamental, participants, statistically, enhances, interrupts

Abstract

BACKGROUND- All of our systems and tissues are affected by ageing, which is a fundamental process. Aging reduces one's muscle strength, balance, and walking speed. By preventing the onset of a handicap, regular walking enhances the quality of life for the elderly and interrupts the cycle of incapacity. OBJECTIVES- Examining the effects of forward and backward walking on the stability and gait velocity of the elderly population. MATERIALS AND METHODOLOGY- A total of 48 participants were chosen at random and split in half. Each group had 5 minutes to warm up and cool down. During the 20 minutes, Group A walked in a Forward direction while Group B walked in a Reverse direction. Each treatment lasted 30 minutes, 3 times each week, for a total of 4 weeks. Performance oriented mobility assessment (POMA) and the Multi-directional Reach Test (MDRT) were used to measure stability and gait speed, respectively. We measured every result both before and after the intervention. RESULT AND CONCLUSSION- Within-group analysis showed statistically significant differences between both groups on the MDRT and the POMA, with the exception of the POMA scale in Group A. POMA T(Total), MDRT Group B showed statistically significant improvement according to the between groups analysis. As a result, both groups were successful in helping the geriatric population's balance and walking speed.Retro walking was found to be superior to forward walking.

1. Introduction

Definition-

Death is the last stage of a dynamic process known as ageing.[1] Human ageing may be broken down into three distinct categories, each of which has repercussions on a different set of body parts and functions. First, there's the "young-old" population (those 65 to 75 years old), then there's the "middle-old" population (those 75 to 85 years old), and finally, there's the "old-old" population (those 85 and over).[2]

Prevalence-

The 2019 report on the state of the world's population from the United Nations Population Fund estimates India's population at 1.36 billion, up from 942.2 million in 1994. It was estimated that 6% of the Indian population aged 65 or older.[3]

The number of those 65 and older is expanding at a far faster rate than any other age group in the country. In the future years, it will become vital for more health care providers to have clinical experience in assessing and treating the particular health challenges of this population. The elderly have a more difficult time maintaining their equilibrium. The capacity to keep one's equilibrium is crucial to practically every aspect of everyday life. The balance system allows us to be aware of our spatial context and to maintain upright posture and stability regardless of whether we are standing motionless or moving. When confronted with the disturbances imposed by functional needs, such as the need to divide attention between tasks as is required to sustain balance while walking in a crowd, the capacity to maintain balance declines in the elderly. Many senior falls are brought on by problems with balance. One of the leading causes of injury and death among the elderly is falling. Thirty to forty percent of patients over the age of 65 fall at least once every year. One-third of those patients die as a result of their fall-related injuries, which may range from mild to severe. The direct costs associated with treating injuries sustained in

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falls account for an incredible 0.1% of overall healthcare expenditures in the United States and up to 1.5% of healthcare costs in European countries. This calculation does not take into account the incalculable costs of the patient's and caregiver's diminished mobility, self-esteem, and ability to do daily tasks independently.[6]

There are two main types of equilibrium: static and dynamic.[4,5]Why balance gets affected in aged people?

As aging happens many changes will occur in human body balance is one of the problem. Balance is one of the main problem that affects geriatric people, the chance of fall is high in this group because of the balance. [12] The senior population is particularly vulnerable to falls, which may lead to permanent disability and other health issues. Thus, functional insufficiency is a result of balance issues in the elderly. Rehabilitation after the early discovery of balance issues and changes to the environment may help avoid falls and improve an individual's quality of life because of dynamic postural control. The rising rates of hospitalisation, morbidity, and mortality among the senior population are major contributors to the rising cost of treating balance problems.

Cardiovascular sickness, metabolic condition, musculoskeletal disorder, neurological disorder, vision and hearing abnormality, fear of falling, surgical procedures, and certain drugs are all potential causes of imbalance.

In reactive postural control, the COM or BOS is repositioned in reaction to an external force occurring on the body (such as a disturbance). The sensory inputs used to start corrective actions are provided by feedback systems. Anticipatory or proactive postural control happens before the body's own actions impose destabilising pressures on the body.

Intervention-

Initiating weight bearing and early mobilisation with walking is beneficial for knee rehabilitation since it is a closed kinetic chain workout regimen. As a means of lowering the risk of discomfort and impairment, regular walking activities are highly suggested. Aging reduces one's muscle strength, balance, and walking speed. Regular walking enhances the quality of life for the elderly and halts the degenerative process that leads to incapacity. Researchers have shown that regular walking may delay the beginning of ageing in healthy seniors by acting as a kind of physiological training.[7] Some examples of these advantages include a lower resting heart rate, better posture, a more positive impression of exhaustion, a higher maximum walking pace (chosen by the individual), lower anxiety, and better mental health. Hence, frequent walking is beneficial for seniors' physical, mental, and social health and should be encouraged. Even simple forward walking is an activity that challenges our balance responses.Forward walking and retro walking is a good exercise for improving gait and mobility in lower extremities. Walking stride starts with the heel striking the ground and ends with the toes off the ground.[9] Sixty percent of a forward walk is spent in the stance phase.[9] There are a number of significant distinctions between regular walking and retro walking. There are typical gestures that one should exhibit while walking ahead. As you kick your leg back, your heel should touch the floor first. Then, when you shift your weight onto your toes, a little bend forms in your previously straight knee. This causes the opposing leg to roll up off the ground on its toes. Regular walking requires this repeated action from heel to toe. Walking backwards is a popular closed kinetic chain exercise that has been shown to strengthen and stabilise the lower body.[8] Walking backwards is almost a carbon replica of walking ahead, just in reversed time. While practising retro walking, the toes touch the ground before the heel.[9] During reverse walking, the muscles that normally accelerate forward motion act as decelerators.[9] A relatively new kind of physical activity, retro walking is great for building stability and leg muscle. By building up the muscles and improving the cardiovascular system, retrowalking has several health benefits. Lower patellofemoral joint response forces were detected in Retro walking compared to forward walking (FW), making it a potentially useful treatment option for patients with lower extremity overuse problems. Patients with hemiplegia may benefit from this exercise because it helps them gain or regain motor control and improves their walking ability. Ying et al.[10] showed that individuals with asymmetric gait patterns due

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to stroke recovery might benefit from BW treatment. And also, Hackney and Earhart[11] Parkinson's disease patients have reported improved functional mobility, gait performance, and balance after participating in retro walking therapy. In order to walk backwards, one must change their gait pattern around. Your bent knee extends back as your leg swings in the air. When you roll from your toes to your heel, your toes touch the ground and your bent knee straightens. The next step is to lift off of your heel while keeping your knee straight, and then repeat. The advantages of walking on your toes and finishing each step with your heel might be substantial. The practise of walking backward has several advantages. Benefits include increased mobility, flexibility, and range of motion in the hamstrings, quadriceps, and knees. As an added bonus, walking backward has many of the same health advantages as normal walking, such as increased calorie expenditure, enhanced cardiovascular health, and enhanced physical coordination. The plantarflexors of the ankle are responsible for forward propulsion, whereas the extensors of the hip and knee are responsible for mostly backward propulsion.

Retro walking among the elderly population is hardly studied. Few studies have examined the after-effects of either forward or backward walking on the elderly. This study aims to examine the differences between the positive effects of forward and backward walking on senior participants' gait stability and gait velocity.

2. Material and Methodology

This are the results of a research comparing the efficiency of forward walking versus backward walking in improving elderly people's stability and gait. This was conducted in KrishnaVishwaVidyapeeth 'Deemed to be' university, karad. A convenient sampling method was conducted among the selected population. The study is design of experimental study. An ethical clearance certificate was obtained by institutional Ethical Committee of Krishna VishwaVidyapeeth 'Deemed to be' University ,Karad. Among those who met the criteria for participation, With the use of a chit, 48 people were picked at random and split in half. Before agreeing to take part in the research, participants completed a permission form and were given a quick evaluation. The competitors were required to take part in a 5-minute warmup and a 5-minute cooldown. During both the warm-up and cool-down periods, they were to do calf and hamstring stretches, such as walking in place and elevating their heels and toes. During 20 minutes, participants were to walk at their own speed along a 20-meter course delineated by two markers. Those in Group A walked forward for 20 minutes, whereas those in Group B walked backward for the same amount of time. Group B had one day of Retro walking practise before to intervention. The subjects were instructed to don sneakers that provided enough arch support, a flexible outsole, and a large toe box. They picked a time of day that wasn't too soon after they'd eaten and when the temperature outside wasn't too chilly or too hot for their comfort. The length of the intervention was four weeks long, with each week consisting of three 30-minute sessions. Performance oriented mobility assessment (POMA) and Multi-directional reach test (MDRT) were used to evaluate stability and gait speed, respectively. Every metric was checked both before and after the intervention was carried out.

3. Results

TABLE 1: BASELINE CHARACTERISTICS OF SUBJECTS IN BOTH GROUPS

characteristics	GROUP A MEAN ± SD	GROUP B MEAN ± SD	p VALUE
Age(years)	69.41 ± 2.84	68.20 ± 2.46	0.150
BMI(Kg/m$^{2)}$	24.14 ± 0.579	23.84 ± 1.303	0.861

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TABLE 2: WITHIN GROUP PRE-POST INTERVENTION MEAN FOR POMA (POMA B, POMA G AND POMA T) SCORE

Group	POMA scale	PRE-INTERVENTION MEAN ± SD	POST-INTERVENTION MEAN ± SD	W VALUE	P VALUE
Group A	POMA-B	13.08 ± 3.72	13.12 ± 3.69	-1.000	0.317
	POMA-G	11.83 ± 0.56	11.91 ± 0.28	-1.414	0.157
	POMA-T	24.91 ± 3.99	25.04 ± 3.82	-1.732	0.083
Group B	POMA-B	13.83 ± 3.08	15.20 ± 2.02	-4.056*	< 0.001
	POMA-G	11.83 ± 0.38	12.00 ± 0.00	-2.000*	0.046
	POMA-T	25.70 ± 3.07	27.25 ± 2.02	-3.992*	< 0.001

* = *Statistically significant*

The outcome indicates that POMA B, POMA G, and POMA T in Group B differ statistically significantly from all other POMA scores in Group A.

TABLE 3: INTERNAL MEAN CHANGE BEFORE AND AFTER INTERVENTION FOR ALL MULTI-DIRECTIONAL REACH MEASUREMENTS

GROUP	MDRT	PRE-INTERVENTION MEAN ± SD (INCH)	POST INTERVENTION MEAN ± SD (INCH)	W VALUE	p VALUE
GROUP A	FR	8.68 ± 1.66	8.71 ± 1.65	-1.94*	0.052
	BR	5.12 ± 1.45	5.19 ± 1.45	-2.87*	0.004
	RR	7.07 ± 1.57	7.13 ± 1.56	-2.46*	0.014
	LR	7.20 ± 1.47	7.25 ± 1.48	-1.96*	0.050
GROUP B	FR	7.85 ± 1.54	10.37 ± 1.82	-4.289*	< 0.001
	BR	5.29 ± 1.76	7.11 ± 1.81	-4.163*	< 0.001
	RR	6.73 ± 1.65	8.87 ± 1.42	-4.291*	< 0.001
	LR	6.91 ± 1.54	9.00 ± 1.40	-4.291*	< 0.001

* = *Statistically significant*

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There was a statistically significant difference between the two groups on every measure of the multidirectional reach test.

TABLE 4: GROUPS' PRIOR TO AND AFTER AN ACTION MEAN WALK-TIMES, SCORE

GROUP	PRE INTERVENTION MEAN ± SD (m/sec)	POST INTERVENTION MEAN ± SD (m/sec)	W VALUE	p VALUE
GROUP A	0.86 ± 0.16	0.89 ± 0.15	-4.22*	< 0.001
GROUP B	0.74 ± 0.12	0.91 ± 0.14	-4.293*	< 0.001

* = *Statistically significant*

Both groups showed statistically significant differences in their walking speeds.

4. Discussion

In the current study, The POMA B, POMA G, and POMA T tests failed to show a statistically significant difference between the groups, while the Multi-Directional Reach Test did. The research by Ross andel et al. suggests that walking may increase muscle strength and flexibility, both of which may improve balance. In a series of group comparisons, Group B performed better than Groups A and C on the POMA B, POMA G, POMA T, and Multi-Directional Reach Test. While comparing data before and after training on slop, researchers Hyun-Gyu Cha et al. observed that the backward walking group's values improved dramatically.

According to the results of the current study, there is a statistically significant difference in the average walking pace between the two groups. There aren't many studies that looked at average people that came to the same conclusion. Improvements in Group B were statistically significant on the POMA B and MultiDirectional Reach tests used in the current investigation, when comparing the two groups. but POMA G in both Groups showed no statistically significant differences. Backward walking lacks the peripheral visual cues and visual flow that are essential for planning movement during forward stride. It might be caused by a lack of visual information, in which case the sensory feedback must be reweighed in order to govern the stepping pattern. Researchers discovered that practising backward walking made it easier for essential muscles, including hip extensors, to contract and contribute to forward walking speed.

Both groups improved significantly over time, however the Between Group findings revealed that the Retro walking group had made greater progress than the Forward walking group in terms of both balance and walking speed.

5. Conclusion

In the current study, it was discovered that forward walking and retro walking helped the elderly population's balance and walking speed. Forward walking was found to be inferior to even retro-walking.

A walking regimen can be done on a budget and without any special equipment.

It is possible to include both forward and backward walking into a fitness and rehabilitation programme for the elderly. With sufficient training and for therapeutic ends, In fact, healthy elderly people may prefer to walk backwards rather than forwards.

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