



A Comparative Study Of Conventional Balance Exercise With Visual And Auditory Stimuli V/S Cognitive Dual Task Training On Balance In Geriatrics,

Author Names: Akanksha Chauhan,¹ Dr. Shama Paveen,² Dr. Sharda Sharma,³ Prof (Dr.) Niraj Kumar⁴ Dr. Tabassum⁵ Dr. Manjul Nautiyal⁶

Affiliation

1. Researcher, Shri Guru Ram Rai School of Paramedical & Allied Health Sciences, SGRRU University, (Dehradun)
2. Assistant Professor, Department of Physiotherapy, School of Paramedical & Allied Health Sciences, SGRRU University, (Dehradun)
3. Ph. D. Scholar, HOD/Associate Professor Physiotherapy Department, Shri Guru Ram Rai School of Paramedical & Allied Health Sciences, Shri Guru Ram Rai University,
4. Professor, Department of Physiotherapy, School of Paramedical & Allied Health Sciences, SGRRU University, (Dehradun)
5. Assistant Professor, Department of Physiotherapy, Shri Guru Ram Rai School of Paramedical & Allied Health Sciences, SGRRU University, (Dehradun)
6. Assistant Professor, Department of Physiotherapy, School of Paramedical & Allied Health Sciences, SGRRU University, (Dehradun)

ABSTRACT

Introduction

In South-Central Asia, the definition of an elderly person is consistent with other reports, such as Indira (1999), and typically refers to someone who is 60 years or older. With advancing age, individuals often experience a multitude of physical, cognitive, and psychological changes. However, these changes are not unavoidable, and the degree to which they impact daily functioning varies widely among individuals. Age-related changes can be classified into three primary categories: ⁽¹⁾

Need of study

There are very few evidence supporting that conventional balance exercise with visual and auditory stimuli improving balance versus cognitive dual task training in geriatrics for improving cognition and balance in geriatrics but none of the studies have been done for comparison between conventional balance exercise with visual and auditory stimuli versus cognitive dual task training improving balance, cognition and quality of life among geriatrics.

Methods:

The study was carried out with total of 46 subjects with impairment will be assign in two groups with 23 subjects in each group with mean age 26.47 ± 26.52 . After thorough assessment and consent was signed. This study was comparison between Group A (conventional balance exercise with visual and auditory stimuli) versus Group B cognitive dual task training in improving balance in geriatrics.

Key Word:- Berg Balance Scale (BBS) AND Activities Balance confidence scale (ABC).

INTRODUCTION

Physical and cognitive resources are known to decline with age, while exercise programmes and dietary modifications seem to have a big influence on the ageing process.²⁰

When doing multiple jobs, elderly adults are more likely to fall because their attention is divided between the two tasks. Variables related to gait vary as a consequence. It is mainly unclear how multiple tasks, as opposed to dual-task training, affect postural stability. The effects of dual task and training implementation on static and dynamic postural stability in various demographic groups²¹ {Fig:-1}.

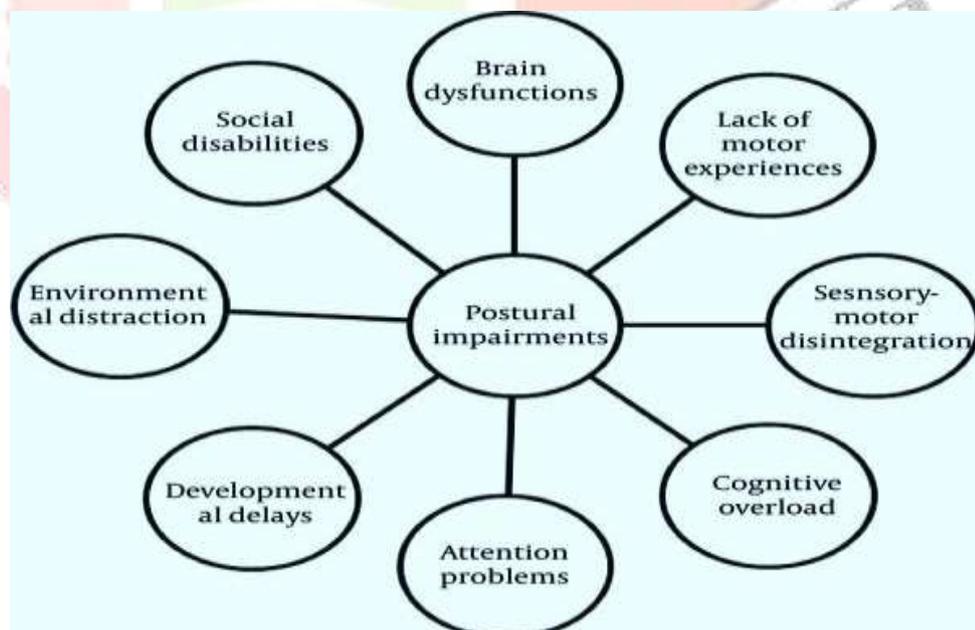


Figure :1: Posture control and multisensory balance training

The maintenance of an upright posture requires the accurate integration of sensory information from ocular, vestibular, proprioceptive, and cutaneous inputs. Additionally, it depends on the effectiveness of postural adaptations in response to different job and environmental requirements. Age-related declines in the sensory systems may result in changes in balance, falls, and serious injuries. As people age, their visual perception tends to decline, particularly in terms of contrast sensitivity and depth perception.²⁴ {Fig:-2}.

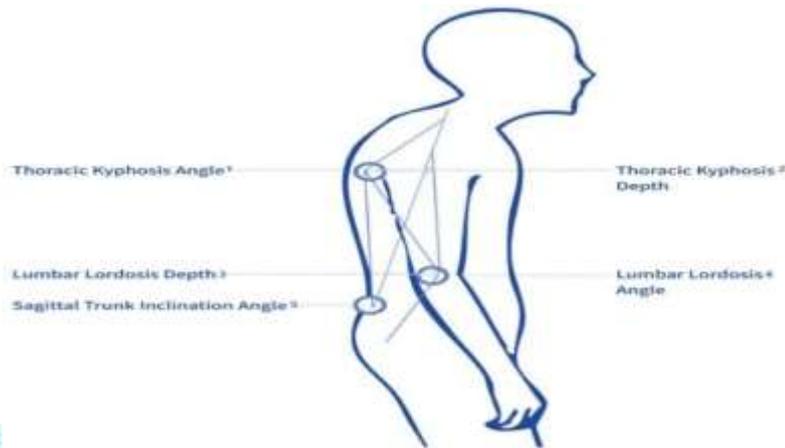


Figure :2: Aging according posture changing

Age-related alterations to physiological systems are often accompanied by a decline in overall health and functional ability. Impaired mobility is a significant factor contributing to functional capacity impairments. The capacity to walk safely is a fundamental aspect of everyday functioning and crucial for maintaining autonomy. Elderly women in their 70s have an increased susceptibility to a deterioration in functional mobility, maybe attributed to a more pronounced reduction in muscle mass and strength.²⁵

The act of executing two tasks at the same time is referred to as dual-tasking. Cognitive function and motor control have been distinguished and the impact of the former on the latter using dual-task paradigms. An increased risk of falling has been seen, for example, among older persons who feel compelled to stop walking while speaking.³⁰

A moderate loss of balance can be seen between the ages of 70 and 80 and beyond, provided there are no age-related disorders known to affect balance. Comparatively speaking, half of the participants in a research of nursing home residents who had frequent falls exhibited severe deficiencies in their postural reactions, along with weaker lower limbs and gait than the controls.³⁵

The gait slows down by 15% per ten years after being mostly stable until the age of sixty. Reduced stride length and single support time (one foot on the ground) and increased double support time (both feet on the ground) are associated with a reduction in walking speed.³⁷

Human memory has been conceptualised in terms of both systems and processes by cognitive psychology. Five types of memory are listed below, according to a systems-based approach of memory. There are five types of memory: procedural memory, which is memory related to skills; perceptual representation of systems involved in object identification and the mechanism behind

perceptual "priming"; semantic memory, which is related to the acquisition and application of general knowledge; short-term memory, which is related to retrieving information from consciousness; and episodic memory, which is related to memory related to personal events encoded in a unique temporospatial context. This arrangement of memory systems is both ontogenetic and phylogenetic in that it matches their assumed developmental sequence.³⁸

The word "presbycusis" refers to the clinical signs of auditory system ageing in elderly individuals, which include bilaterally symmetrical hearing loss. Presbycusis may start slowly; often, the higher frequencies are affected first. But as time goes on, the frequency of the high range of human speech is impacted, which makes it harder to distinguish between consonants. There are four recognised forms of presbycusis disease. They are mechanical, neurological, metabolic, and sensory. A pure-tone threshold curve with good speech discrimination that is bilaterally symmetric and suddenly drops is the audiometric definition of sensory presbycusis.⁴⁰

In South-Central Asia, the definition of an elderly person is consistent with other reports, such as Indira (1999), and typically refers to someone who is 60 years or older. With advancing age, individuals often experience a multitude of physical, cognitive, and psychological changes. However, these changes are not unavoidable, and the degree to which they impact daily functioning varies widely among individuals. Age-related changes can be classified into three primary categories: (1)

alterations in general health indicators, such as pulmonary function, muscle power, endurance, and anthropometric measurements; modifications in neurological variables, including balance, gait, memory, and hearing acuity; and (3) shifts in psychological measures, such as mental state and quality of sleep. Understanding these categories is essential for identifying the specific needs of the elderly population and developing appropriate interventions. (2 & 3)

Functional mobility, defined as the ability to move safely and efficiently within one's environment, is a fundamental aspect of daily functioning and independence. Age-related declines in mobility, particularly in women aged 70 and above, have been associated with a more pronounced reduction in muscle mass and strength. Reduced mobility is a strong predictor of falls and an increased likelihood of institutionalization. Various assessments, such as the Timed-Up & Go (TUG) test and the Berg Balance Scale, have been developed to evaluate functional mobility, balance, and fall risk in older adults. Poor performance on these tests has been linked to a higher risk of falls, underscoring the importance of interventions aimed at enhancing mobility and maintaining independence.

Attention demand and cognitive resources also play a significant role in functional mobility and balance. Older adults often struggle with dual-task scenarios, where attention must be divided between a balance task and a secondary task. The ability to prioritize tasks becomes compromised with age, leading to impaired motor performance and an increased risk of falls. Dual-task training programs have shown promise in improving both cognitive and motor performance in older adults, suggesting that interventions targeting cognitive-motor coordination may be particularly beneficial for this population.

The integration of balance, gait, and mobility assessments into clinical practice is essential for identifying individuals at risk of falls and implementing effective interventions. Comprehensive balance training programs, including strength training and dual-task exercises, have been shown to improve balance and reduce fall risk in older adults. Additionally, cognitive training programs that enhance attention and processing speed can further support functional mobility and reduce the likelihood of falls.

In conclusion, the aging process is associated with a range of changes that can impact functional mobility, balance, and overall quality of life. Understanding these changes and their implications is essential for developing targeted interventions that promote healthy aging and improve the quality of life for older adults.

By addressing the multifaceted nature of aging and implementing evidence-based strategies, healthcare providers can support older adults in maintaining independence and reducing the risk of falls and related injuries.

Aim of study:

To compare the effects of conventional balance exercise with auditory and visual stimuli v/s cognitive dual task training on balance in geriatrics.

Objectives of study:

- To see the effect of conventional balance exercise along with auditory and visual stimulus in geriatrics.
- To see the effect of cognitive dual task training on balance in geriatric.

Need of study:

There are very few evidence supporting that conventional balance exercise with visual and auditory stimuli improving balance versus cognitive dual task training in geriatrics for improving cognition and balance in geriatrics but none of the studies have been done for comparison between conventional balance exercise with visual and auditory stimuli versus cognitive dual task training improving balance, cognition and quality of life among geriatrics.

Purpose of the study

The purpose of this study is to find out a better result in conventional balance exercise with auditory and visual stimuli and cognitive dual task training in geriatrics for improving the balance ,cognition mobility impairments and quality of life enhancing the independent ADL 's

Hypothesis

Experimental Hypothesis (H1): Experimental hypothesis states that there may be sufficient difference between the effect of conventional balance exercise with auditory and visual stimuli and cognitive dual task training in improving balance,mobility and quality of life among geriatrics patients.

Null hypothesis (h0): Null hypothesis states that there may not be significant difference between the effect of conventional balance exercise with auditory and visual stimulus and cognitive dual task training improving balance ,mobility and quality of life among geriatrics patients

REVIEW OF LITERATURE

Mary et al., 2024 examined the impact of balance in residents of assisted-living facilities. The study compared the results of three different assessments: the Berg Balance Scale, the Multi-Directional Reach Test, and the Activities-Specific Balance Confidence Scale. A cohort of 26 participants was chosen using a randomised selection procedure. The research findings suggest that individuals living in personal care homes have a significantly elevated risk of falling. The balancing tests demonstrated satisfactory to excellent dependability for this particular group. Based on the evidence, it seems that the BBS and MDRT are reliable indicators of motor capacity to sustain balance, but the self-report ABC assesses a distinct aspect of the balance concept in this specific population

Trombini-Souza et al., 2023 assessed how mixed dual-task training affects older persons who live in communities as regard to their mobility, cognitive function, and balance. A 1:1 randomization process was used to place sixty participants either in the experimental group, which consisted of single motor task and simultaneous dual task assigned alternately for 12 weeks in stage 1 and strictly SDT in stage 2 or in the control group, which consisted of only SMT and SDT assigned alternately in stages 1 and 2. Two inertial sensors were used to collect gait characteristics. Utilising certain questionnaires, physical and cognitive performance was measured. The analysis of interaction and main effects was done using generalised linear mixed models. Both protocols improved mobility, dual-task effect, lower limb function, static and dynamic balance, body sway, and cognitive function. There was no significant difference observed between the groups for gait performance. These results were enhanced by both dual-task training procedures.

Tasvuran Horata et al., 2021 sought to compare the effects of individual progressive single- and dual-task training on cognition and gait in healthy older adults. 32 individuals in total were split into two groups at random: the dual-task group and the single-task group. The spatiotemporal gait characteristics were evaluated using the LEGSys device during a 10-meter walk test. The Stroop Test and the Standardised Mini-Mental State Exam were used to assess the cognitive characteristics. For a duration of six weeks, two times a week, separate progressive 60-minute single- and dual-task training regimens were implemented. In the dual-task training group, there were significant differences in both gait and cognitive characteristics ($p < 0.05$). The dual-task training group outperformed the single-task training group in terms of gait speed, cadence, and other cognitive factors, according to comparisons of the delta values between the groups. Individual progressive dual-task training is a practical and effective way to help older people with their cognitive abilities and gait performance.

Su-lin ZHANG et al., 2021 founded that multisensory exercise helps those with balance disorders. Nine RCTs and eleven nonrandomized studies with a combined total of 667 participants were qualified. The results validated our hypothesis that multisensory exercise helped individuals with balance issues become more balanced. Based on randomised controlled trials, all 20 studies were deemed to be of good or moderate quality. According to the study's findings, 9 RCTs and 11 nonrandomized trials with a combined total of 667 individuals were qualified. The results validated the idea that multisensory exercise helped individuals with balance issues become more balanced.

METHODOLOGY:

Approval from the Institutional Ethics Committee of Shri Guru Ram Rai Institute of Medical & Health Sciences, Patel Nagar, Dehradun Registration number:- SGRR/IEC/01/24 was sought.

The total of 46 subjects will be assign in two groups with 23 subjects in each group. The estimated sample size (n) is calculated as the solution of.

$$n = \frac{(t_{n-1, \alpha/2} + t_{n-1, \beta})^2}{d^2}$$

The estimated sample size n is calculated as the solution of: where

$d = \text{delta}/\text{sd}$, $\alpha = \text{alpha}$, $\beta = 1 - \text{power}$ and

t_v, p is a Student t quantile with v degrees of freedom

and probability p . n is rounded up to the closest integer.

here $d = 4.2$ and $SD = 3.30$ based on reference study.

The study was pre and post-test comparative design. After thorough assessment and consent was signed, study was conducted at the department of Physiotherapy, SMI Hospital, Dehradun. Each subjects received the treatment for 5 days/weeks. Time duration of the treatment was approx.. 40- 45 minutes for each session.

The subject were selected according to inclusion and exclusion criteria. Subjects were included as with mean age of 50-85 yrs. Who is having with balance issue in geriatrics. Subjects were excluded that who is having Musculoskeletal Injuries, fixed contractures or deformity .Co-morbidities, subject unable to give informed consent .Neurological Condition and Impaired Cognitive Condition. Outcome Measurement: Berg BALANCE SCALE (BBS) AND Activities Balance confidence scale(ABC).

PROCEDURE

The subjects were taken for primary evaluation and those who satisfied the inclusion criteria will be randomly allocated into two groups A and B. Individuals selected for the study were assessed prior and post of the interventions program with outcome measures like: Berg Balance Score and Activities specific balance confidence (ABC)Scale.

Group A

- ✧ Conventional balance exercise with visual and auditory stimuli: Participants were undergoing traditional physiotherapy consisting of trunk exercises conducted on the plinth. The supine movements include bridging, unilateral bridging, and trunk rotation.
- ✧ The exercises in sitting: Trunk extension and flexion; trunk lateral flexion starting at the shoulder and pelvic girdle; trunk rotation starting at the upper and lower extremities; and shifting the pelvis forward, backward, and side to side on a plinth. If necessary, these exercises were carried out with help at first, until no support was needed. For a total of 40 minutes, including a 6-minute break based on the patient's needs, the exercises were done once a day, five days a week for six weeks, in both supine and sitting positions.
- ✧ Single Leg Stance with Visual Focus: Stand on one leg and fixate on a visual point. Progress by turning head or incorporating moving visual stimuli.
- ✧ Balance on Unstable Surface: Use balance pads or wobble boards to challenge stability. Combine with visual focus or introduce auditory cues for added complexity, Tandem Walk with Auditory Cues, Walk heel-to-toe in a straight line, Crossover Steps with Obstacle Avoidance, Place obstacles on the floor and practice crossing over them {Fig:-3 & 4}.



Fig:-3: Showing Unilateral Bridging Exercise



Fig: 4 : Showing Bilateral Bridging Exercis

Group B

Cognitive dual task training improves functional ability with balance.

- ✧ Walking and doing mathematical operations, word searches, word sequence repetition, etc. DTM: moving while holding something, walking, or using force.
- ✧ two-footed postures, semi-tandem, tandem, one-footed support; dynamics like two-person walking or turning, heel or toe support, combined with mental exercises like backward counting
- ✧ There was just one motor task for the first six sessions; from the seventh to the twelfth, there was a motor task together with a basic cognitive task; and from the thirteenth to the twenty-fourth, there were increasingly challenging cognitive tasks.
- ✧ Standing on an unstable surface with eyes closed, with different support bases, plus a second manipulative motor task or cognitive task.
- ✧ Balance tasks such as posture maintenance, walking activities, plus secondary tasks such as subtraction, auditory and visual discrimination. Prioritisation according to group.
- ✧ Walk plus arithmetic exercise: after gaining confidence on a single task, students were given a basic arithmetic exercise that increased in complexity.
- ✧ Balance and gait exercises, maintaining postures, walking on a foam beam, etc., plus number randomisation, word association, reciting and memory work. Change of prioritisation.
- ✧ Motor tasks such as: walking, bouncing a ball, exercising with weights, plus cognitive tasks such as: pronouncing animal names, counting backwards, naming shapes and colours.
- ✧ Stunting, walking with a little base of support, walking backwards, and more cerebral activities like labeling things and recalling numbers. applying the ranking system that was appropriate for each group.
- ✧ While seated, students completed a verbal fluency test that included identifying animals and words that started with a certain letter in addition to a physical exercise that involved moving steps.
- ✧ Dual tasking involves higher levels of cognitive function, including decision-making, mental acuity, and response time monitoring. After 6 weeks , assesment was done by measuring BBC scale and ABC scale{Fig:- 5 (a) & (b)}.



Fig:5: Showing walking over hurdles along with counting the numbers from 1 to 100

RESULT :

Statistical analysis was carried out physically as well as with statistical software SPSS 21 version and Microsoft word, Excel has been used to generate graphs table etc. Various statistical measures such as mean, standard deviation, paired t test were utilized for all the scores of participants included in the study. To analyze the difference between Group A and B in pre and post intervention.

Comparison within Group A showing Mean \pm SD of Berg Balance Score at Pre and post score measurement

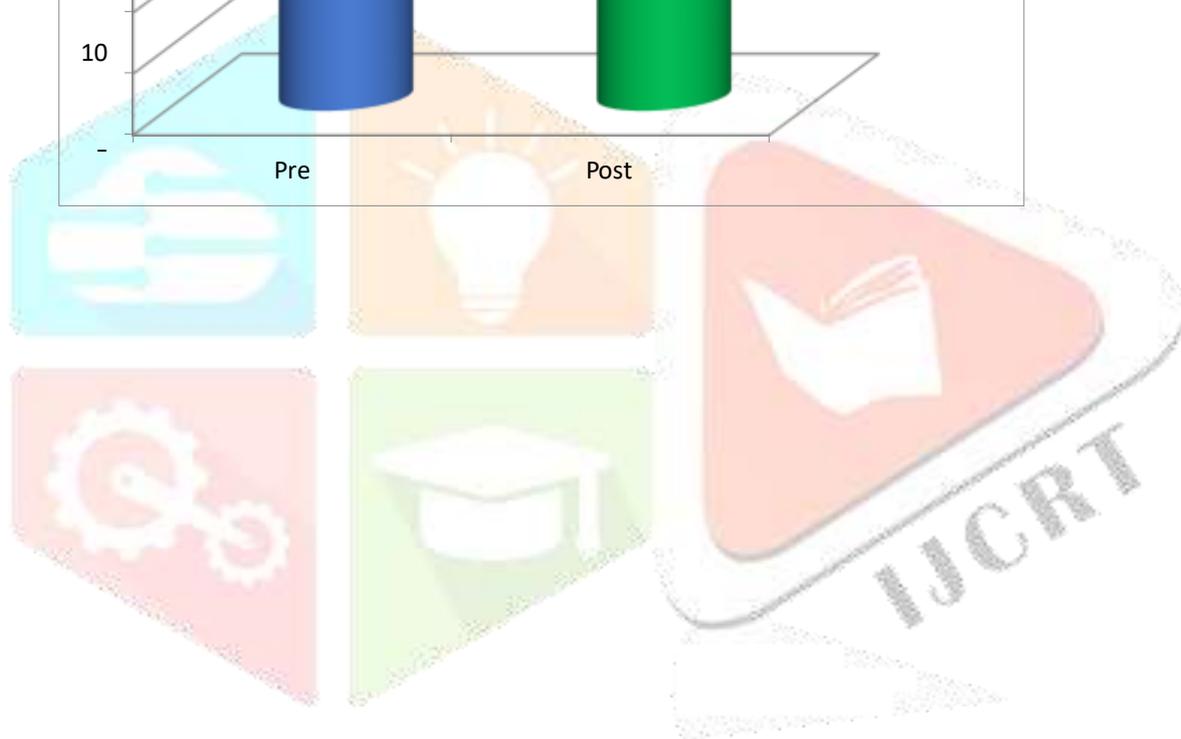
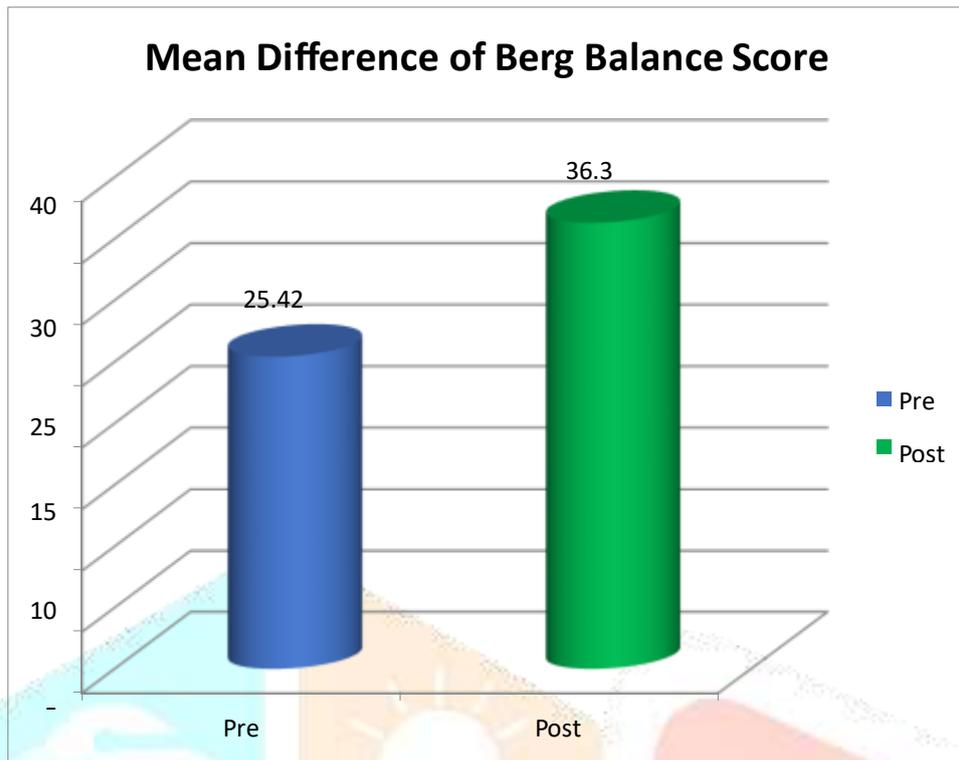
To analyze the difference in the Berg Balance Score within groups paired t test was used. The difference in Berg Balance Score scores pre Mean & SD 25.42 ± 9.699 and post Mean & SD 36.30 ± 7.654 .

Table 1: Mean, \pm SD, t-value and p value of Berg Balance Score within Group A

	Mean \pm SD	t-value	P- Value	Result
Group A				
Pre	25.42 ± 9.699	10.849	0.0001	Highly significant
Post	36.30 ± 7.654			

$P > 0.05$ non-significant, $p < 0.05$ significant

Graph 1 A graphical representation within a Group A: Mean Difference of Berg Balance Score at pre and post intervention .



Comparison within Group B showing Mean \pm SD of Berg Balance Score at Pre and post score measurement

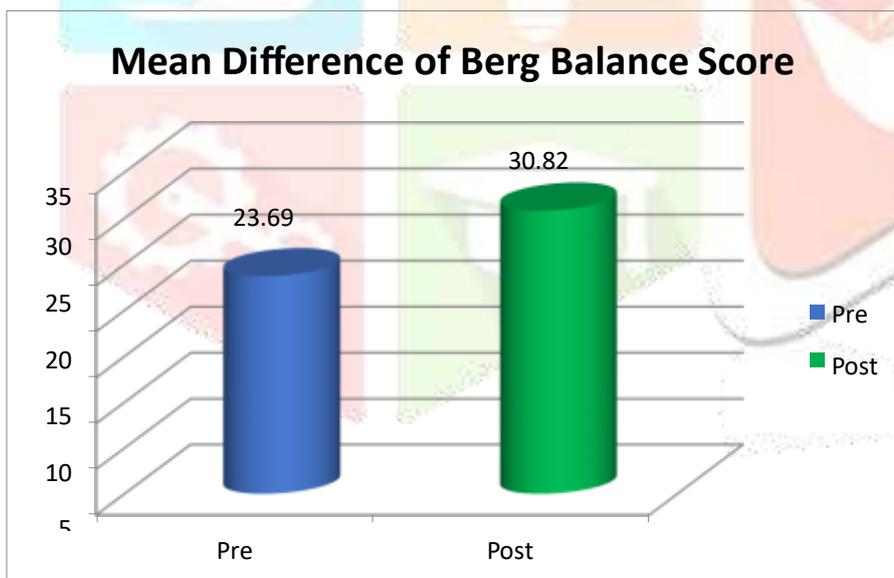
To analyze the difference in the Berg Balance Score within groups paired t test was used. The difference in Berg Balance Score scores pre Mean & SD 23.69 ± 9.032 and post Mean & SD 30.82 ± 6.925 .

Table 2: Mean, \pm SD, t-value and p value of Berg Balance Score within Group B

Group B	Mean \pm SD	t-value	P- Value	Result
Pre	23.69 ± 9.032	4.372	0.0001	Highly significant
Post	30.82 ± 6.925			

$P > 0.05$ non-significant, $p < 0.05$ significant

Graph 2 A graphical representation within a Group B: Mean Difference of Berg Balance Score at pre and post intervention .



A Comparison between Berg Balance Score between Group A and Group B at post intervention.

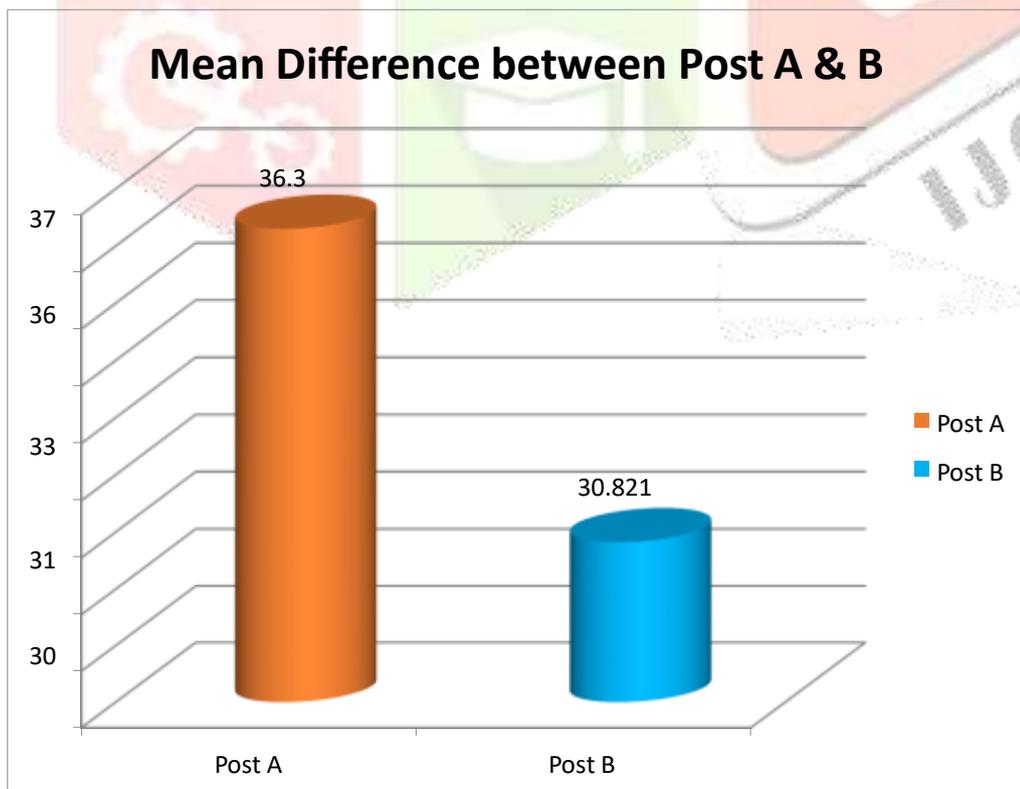
To analyze the difference in the Berg Balance Score between groups Independent t test was used. The difference in Berg Balance Score scores in Groups A and B of post Mean & SD 36.30 ± 7.654 and post Mean & SD 30.821 ± 6.921 .

Table-3: A Comparison between Group A and Group B showing Mean \pm SD of Berg Balance Score at posts score measurement

Group A and B	Mean \pm SD	t-value	P- Value	Result
Post A	36.30 ± 7.654	2.525	0.015	significant
Post B	30.821 ± 6.921			

$P > 0.05$ non-significant, $p < 0.05$ significant

Graph- 3 A graphical representation of comparison between Group A and Group B; Mean Difference of Berg Balance Score at post intervention.



Comparison within Group A showing Mean \pm SD of ABC Scale at Pre and post score measurement

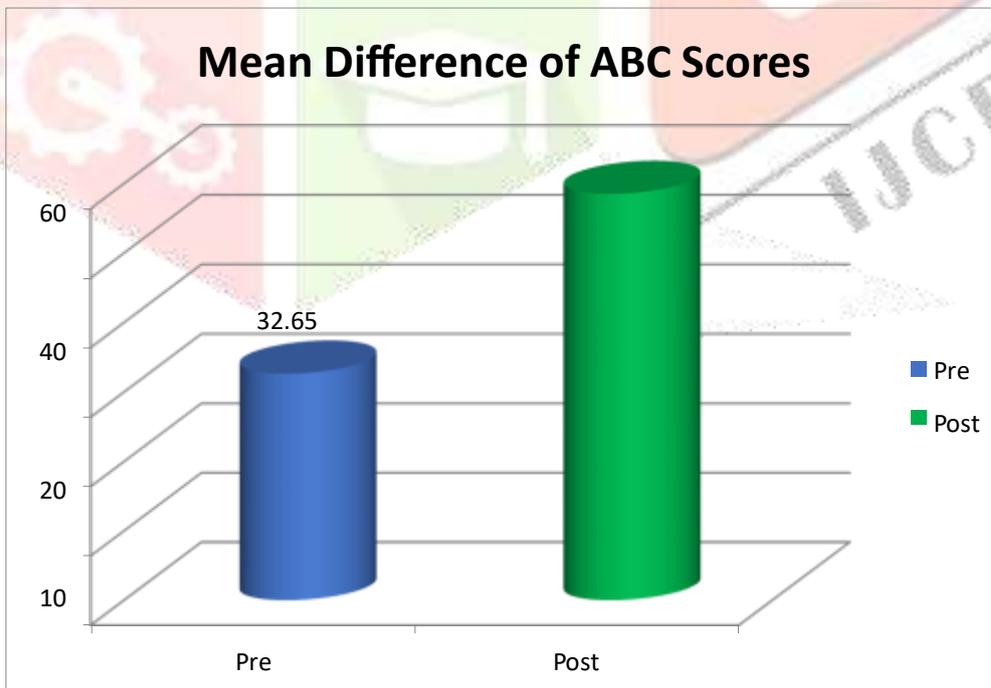
To analyze the difference in the ABC Score within groups paired t test was used. The difference in ABC scores pre Mean & SD 32.65 ± 16.44 and post Mean & SD 58.52 ± 12.21 .

Table 4: Mean, \pm SD, t-value and p value of ABC Scale within Group A

Group A	Mean \pm SD	t-value	P- Value	Result
Pre	32.65 ± 16.44	11.047	0.0001	Highly significant
Post	58.52 ± 12.21			

$P > 0.05$ non-significant, $p < 0.05$ significant

Graph 4 A graphical representation within a Group A: Mean Difference of ABC scale at pre and post intervention .



Comparison within Group B showing Mean \pm SD of ABC Scale at Pre and post score measurement

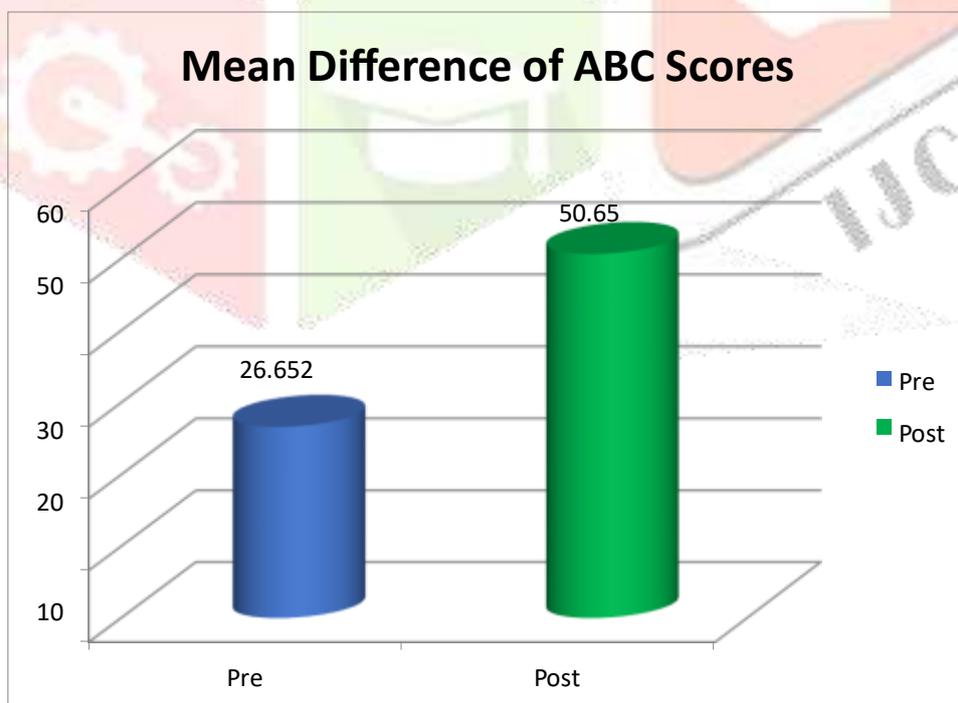
To analyze the difference in the ABC Score within groups paired t test was used. The difference in ABC scores pre Mean & SD 26.652 ± 11.66 and post Mean & SD 50.65 ± 15.44 .

Table 5 : Mean, \pm SD, t-value and p value of ABC Scale within Group B

Group B	Mean \pm SD	t-value	P- Value	Result
Pre	26.652 ± 11.66	9.701	0.0001	Highly significant
Post	50.65 ± 15.44			

$P > 0.05$ non-significant, $p < 0.05$ significant

Graph 5 A graphical representation within a Group B: Mean Difference of ABC scale at pre and post intervention .



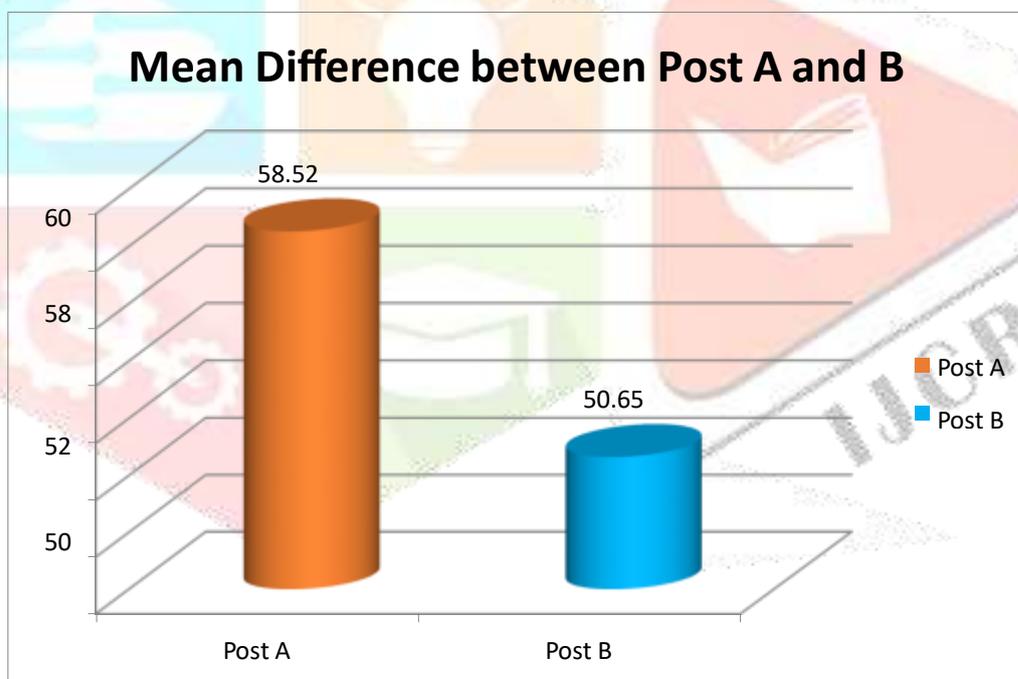
A Comparison between ABC Scale between Group A and Group B at post intervention.

To analyze the difference in the ABC Score between groups Independent t test was used. The difference in ABC scores between group A and B post Mean & SD 58.52 ± 12.21 and post Mean & SD 50.65 ± 15.44 .

Table 6: A Comprison between Group A and Group B showing Mean \pm SD of ABC scale at posts score measurement

Group A and B	Mean \pm SD	t-value	P- Value	Result
Post A	58.52 ± 12.21	1.916	0.042	Significant
PostB	50.65 ± 15.44			

$P > 0.05$ non-significant, $p < 0.05$ significant



Graph.6 A graphical representation of comparision between Group A and Group B; Mean Difference of ABC Scale at post intervention.

DISCUSSION:

The purpose of this study was to determine whether conventional balance exercise with visual and auditory stimuli v/s cognitive dual task training on balance in geriatrics was compared in this study.

This study aimed to evaluate the effects of two distinct intervention programs on balance and cognitive function: conventional balance exercises (Group A) and cognitive dual-task training (Group B). Both groups were assessed using the Berg Balance Scale (BBC) and the Activities-Specific Balance Confidence (ABC) Scale before and after a six-week intervention period.

The Effectiveness of these Interventions in Group A, which underwent conventional balance exercises, showed improvements in balance through a structured regimen of trunk and single-leg stance exercises, with visual and auditory stimuli to enhance the challenge. This group's focus on traditional balance exercises is supported by existing literature, which suggests that such exercises can significantly improve balance and stability, particularly when combined with visual and auditory cues (Berg et al., 1992; Shumway-Cook & Woollacott, 2007). The inclusion of unstable surfaces and obstacle avoidance likely added a dynamic aspect to the training, promoting functional balance improvements that are often necessary for daily activities.

On the other hand, Group B engaged in cognitive dual-task training, integrating motor tasks with cognitive challenges. This approach reflects the growing recognition of the importance of dual-task training for improving both motor and cognitive functions simultaneously (Silsupadol et al., 2006; Yekutieli et al., 2020). The progressive increase in task complexity and the incorporation of cognitive tasks such as arithmetic and word associations provided a comprehensive stimulus for both physical and mental processes. The higher cognitive demand in later sessions likely contributed to more significant improvements in functional ability and balance, given the emphasis on mental acuity and decision-making under varied conditions.

In this section, the result of this study will be discussed in view of this possible rationale involved & the findings will be compared with the previously available literature. This study indicates that both the chosen protocols yield significant results. Thus, present study was planned to compare between conventional balance exercise with visual and auditory stimuli v/s cognitive dual task training on balance in geriatrics. The present study included 46 subjects with assigned consent, and were selected as sample size with the age of 50 to 85 years. Both groups showed significant improvements in balance scores post-intervention, indicating the effectiveness of the interventions employed. However, Group A demonstrated a greater enhancement in balance outcomes compared to Group B.

The purpose of this study aimed was to compare the efficacy of two therapeutic interventions—conventional balance exercise with visual and auditory stimuli (Group A) v/s cognitive dual task training on balance (Group B) in geriatrics.

The primary outcome measures included the Berg Balance Scale (BBS) and Activities Balance Confidence Scale (ABC). These findings offer valuable insights into the relative benefits of these therapeutic exercises and their potential effect in clinical practice.

The outcome measure included that Berg Balance Score Analysis: Group A showed a more substantial improvement in the Berg Balance Score (Mean \pm SD: 36.30 \pm 7.654) compared to Group B (Mean \pm SD: 30.82 \pm 6.925). The independent t-test results revealed a statistically significant difference ($p = 0.015$), suggesting that the intervention in Group A was more effective in improving balance. This aligns with the notion that Group A's intervention may have had a more profound impact on balance capabilities.

The outcome measure included that ABC Scale Analysis: Similarly, the ABC Scale scores also improved significantly in both groups. Group A's post-intervention score (Mean \pm SD: 58.52 \pm 12.21) was higher than that of Group B (Mean \pm SD: 50.65 \pm 15.44), with a significant p-value of 0.042. This indicates that Group A's intervention was more successful in enhancing participants' confidence in their balance and activity performance.

The results of this study align with a comparative study of conventional balance exercise with visual and auditory stimuli v s cognitive dual task training on balance in geriatrics intervention strategies applied in Group A were more effective in improving both balance and confidence compared to those in Group B. This might be attributed to differences in the nature or intensity of the interventions. The significant improvements observed in both measures for Group A highlight its superior efficacy, which could be explored further in future studies to understand the underlying mechanisms contributing to these outcomes.

Overall, the findings underscore the importance of tailored interventions and suggest that optimizing intervention strategies can lead to more substantial improvements in balance and confidence, crucial for functional independence and quality of life.

CLINICAL RELEVANCE:

This study's findings hold significant implications for clinical practice, particularly in designing and implementing interventions aimed at improving balance and confidence in patients. The clear superiority of Group A's intervention in both the Berg Balance Score and the Activities-specific Balance Confidence (ABC) Scale indicates that targeted and possibly more intensive or comprehensive interventions may yield better outcomes.

LIMITATIONS OF THE STUDY:

1. The sample size of 46 participants may limit the generalizability of the results.
2. Long-term intervention would provide a better understanding of the lasting effects of the interventions.
3. Future research could further explore the specific cognitive demands that most effectively enhance balance and the potential for these interventions to address various populations, such as the elderly or individuals with neurological disorders.

FUTURE SCOPE:

The study's results advocate for further research into the specific elements of the interventions used in Group A. Understanding what made Group A's intervention more effective could lead to the development of best practices and more robust intervention strategies. Future studies could explore the intensity, duration, and components of the interventions to identify key factors contributing to superior outcomes.

CONCLUSION:

The result of Group-A & Group-B showing significant differences at p values. As comparing the mean difference of post scores between both the groups, the mean difference in Berg Balance Score for Group- A is 36.30 which is greater than Group- B is 30.82, this result showed that Group A is more effective in Berg Balance Score as compared to Group B. On the other hand, while comparing the mean difference between both the Group A and Group- B in ABC scores, Group-A showed 58.52 which is greater than Group- B showed 50.65 that indicated that the Group-A is more effective in ABC score as compared to Group-B.

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