Section A-Research paper

IMPACT OF VISION ON STATIC BALANCE

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ABSTRACT

Background and Purpose: Vision is a crucial element of the system responsible for postural control. Several studies show that balance is impaired when the possibility to receive visual stimuli is reduced due to visual acuity impairment- mentor the lack of visual feedback. The purpose of the study was to check the effects of vision static balance.

Materials & Methods: The study included 30 people who volunteered to participate. Two groups (GA-15n) were formed (GB-15n). GROUP A has no vision problems or problems with their eyesight. GROUP B has a visual problem (they wear spectacles or lenses). The Berg balancing scale and the Romberg test were used to creating a questioner. The Breg balance scale and the Romberg test were used to help both groups. The data was gathered and entered into the questioner. SPSS 21 was used to analyze the data. For the comparison and significance level, a paired T-test was used. Both groups' correlation was calculated.

Results: The results are quite apparent and reveal that vision does affect the participants' static equilibrium. According to the Berg Balance Scale, the Group B score (26.00±16.497) is lower than the Group A score (60.0), indicating that the group b subjects are not properly balanced. According to the Romberg Test, Group A has 0 positive subjects while Group B has 13 positive subjects. This demonstrates that the vision has a substantial impact on the static equilibrium.

Conclusion: As a result of this research, it was discovered that eyesight had a major impact on static balance. The body's equilibrium can be affected by vision.

INTRODUCTION

The capacity to maintain one's line of gravity within their base of support is described as balance (BOS). It's also known as homeostasis, which is described as a condition in which all active forces cancel out, resulting in a stable and balanced system. The words "balancing," "postural control," "postural stability," and "equilibrium" are all used interchangeably in the literature. (1).

The Central Nervous System collects information about body alignment from these three main sensory systems, integrates it, and then applies a corrective, stabilising torque through selective muscle activation.(1).

Healthy individuals depend 70% on somatosensory information, 20% on vestibular information, and 10% on vision while standing on a solid surface, but 60% on vestibular information, 30% on vision, and 10% on somatosensory information when standing on an unstable surface.(2).

Proprioceptive input from spinocerebellar pathways must be processed subconsciously in the cerebellum to maintain postural balance. (3)In normal circumstances, proprioceptive information has the shortest time delays, with monosynaptic pathways processing information in as little as 40–50 milliseconds(4), and therefore contributes the most to postural control.

In most circumstances, the visual system's contribution to posture control is somewhat redundant for non-impaired people due to longer temporal delays of up to 150-200 milliseconds.(5).

According to Friedrich et al., people with visual impairments were able to compensate for their lack of visual information and retain good postural control by changing peripheral, vestibular, somatosensory perception, and cerebellar processing (4). Furthermore, Peterka found that individuals with bilateral vestibular impairments may need even greater improvement in visual and proprioceptive information than healthy people to maintain sufficient postural stability. The visual environment as well as the support surface, which includes the size of the base of support as well as its stiffness or compliance, affect the effect of changing visual fields on postural stability.(4).

The ability to maintain one's body in a stable posture is referred to as static equilibrium. Static balance is the ability to maintain postural stability and orientation with the centre of mass over the base of support and the body at rest. (6).

Dynamic balancing, which is more harder to describe, is the ability to alter the vertical projection of the centre of gravity around the supporting base of support. The capacity to maintain postural stability and orientation as the body components move and the centre of mass is above the base of support is known as dynamic balance. Sell TC investigated the differences and relationships between static and dynamic postural stability in healthy, physically active individuals (2012). (1). Static postural stability was assessed using a single-leg standing task, whereas dynamic postural stability was assessed using the Dynamic Postural Stability Index. There is no connection between static and dynamic data, according to the author. The increase in difficulty during dynamic evaluations, on the other hand, shows that various postural stability tasks offer varied kinds and degrees of difficulty. (7).

The stress put on the mechanisms that maintain the body upright is most likely to blame for the absence of a link between the two illnesses. In both dynamic and static circumstances, maintaining postural stability requires a delicate balance of destabilising and stabilising forces, as well as sensory information from the eyes, the vestibular system, and somatosensory feedback. (8).

STATEMENT QUESTION

Is there any effect of vision on static balance?

AIMS AND OBJECTIVES OF THE STUDY

The main aim of the study is to find out the effect of vision on static balance.

The main objective of this study is to see the effect of vision on static balance using Berg balancing scale and the Romberg test

HYPOTHESIS

NULL HYPOTHESIS: There is no effect of vision on static balance.

RESEARCH HYPOTHESIS: There is a significant effect of vision on static balance.

TOOLS USED:

1. BERG BALANCE SCALE
2. ROMBERG'S TEST

BBS

Description: The Berg balance scale assesses a patient's ability (or inability) to maintain stable balance while doing a series of activities. It's a 14-item list that takes approximately 20 minutes to complete, with each item consisting of a five-point ordinal scale ranging from 0 to 4, with 0 denoting the lowest level of function and 4 being the greatest. The gait assessment is not covered.

Validity and Reliability:

In investigations of different elderly populations (N = 31–101, 60–90 years old), high intrarater and interrater reliability was observed (ICC =.98,14,15 ratio of variability across patients to total =.96–1.0,16 rs =.8817). Test-retest reliability is also high in 22 individuals with hemiparesis (ICC [2,1]=.98).

ROMBERG'S TEST

Description: In humans, the Romberg test is used to demonstrate how posterior column disease affects upright postural stability. Tabes dorsalis neurosyphilis is a kind of posterior column illness that damages the posterior column in a particular way. The Romberg test is used to evaluate individuals who have ataxia or disequilibrium due to sensory or motor disorders. Equilibrium is a condition in which all active forces cancel out, resulting in a balanced, stable system. Sensory input from the vestibular, somatosensory, and visual systems keeps it alive. Even if a patient's proprioception (somatosensory) is compromised, vestibular function and vision may aid in balance maintenance. In the Romberg test, the patient is asked to shut his eyes and stand up straight. A positive Romberg sign is regarded as a lack of balance. The Romberg test was created in 1846 with the goal of diagnosing tabes dorsalis. When ataxia or disequilibrium is suspected, it's critical to evaluate other elements of the patient's balance before doing the Romberg test. Proprioceptive problems aren't usually the first problem this group encounters. It may be a lot easier at times. Other features of balance impairment should be evaluated first to rule out confounding variables that may lead to a false positive result.

Validity and Reliability: Because the exam is more qualitative than quantitative, there is no agreement in the literature on reliability (intra and inter) and validity for Romberg's (Objective). This test, on the other hand, may be utilised as a fast clinical screening tool. The development of different equipment in the field of balance evaluation and the use of force platforms has resulted in more objective and precise measurements.

METHODOLOGY

Type of study: An Experimental Study

Sampling: Simple Random Sampling

Area of Project: Greater Noida

Sampling Method:

- No of Sample:30
- Groups: Two groups (15 subjects in each group)

  Group 1 – have no vision issue and nether any disturbance in eyes

  Group 2 – have a vision issue (use spectacles /lens)

- Sample place: Multicentric Grounds

Inclusion Criteria:

1. Spectacles / lens user
2. Healthy population
3. Normal biomechanis.

Exclusion Criteria:

1. Neurologicals unstable
2. Unstable biomacanic
3. Abnormal posture.

PROCEDURE

The volunteers who agreed to participate in the research were divided into groups. Everyone was assured that their information would be kept private. All participants completed the permission form and provided their consent for the research before filling out demographic information such as their name, age, height, weight, gender, and profession.

1. Consent Form: This form provided information regarding the purpose and proposed outcomes of the study and allows the participants to give their agreement for the study and participate anonymously. The subjects were guaranteed about their information is confidential and they will not be receiving any form of compensation or credit for the study as the participation is voluntary.
2. After the completion of the consent form, the demographics including the name, age, gender, height, occupation, and address were taken.
3. The participants in Group A were then instructed to execute tasks such as sitting to standing, standing unaided, sitting unsupported, and standing unsupported. From standing to sitting, Transfers, Standing with eyes closed, feet together, reaching forward with extended arm, retrieving something from the floor Turning around to see behind you, turning 360 degrees, putting one foot on a seat, and so on. Standing on one foot with one foot in front of the other.

4. All scores were recorded in Google form.

5. The Group A subjects were asked to perform activities for the Romberg test.

6. Same it was done with GROUP B

7. All scores and data were filled in google forms and were stored in M.s excel.

8. Data were analyzed using the SPSS 26.

3.1: Subject of performing berg balance tests

3.2: Subject of performing Romberg test

RESULTS

The results are quite apparent and reveal that vision does affect the participants' static equilibrium. According to the Berg Balance Scale, the Group B score (26.0016.497) is lower than the Group A score (60.000.00), indicating that the group b subjects are not properly balanced. According to the Romberg Test, Group A has 0 positive subjects while Group B has 13 positive subjects. This demonstrates that the vision has a substantial impact on the static equilibrium.

LIST OF TABLES:

TABLE NO 5.1: DEMOGRAPHIC DESCRIPTIVE STATISTICS OF GROUP 1 AND GROUP 2

	AGE	WEIGHT	HEIGHT
Mean	24.83	68.27	5.670
N	30	30	30
Std. Deviation	4.300	9.847	.3807

TABLE NO 5.2: COMPARISON OF BERG BALANCE SCALE SCORES OF GROUP 1 AND GROUP 2

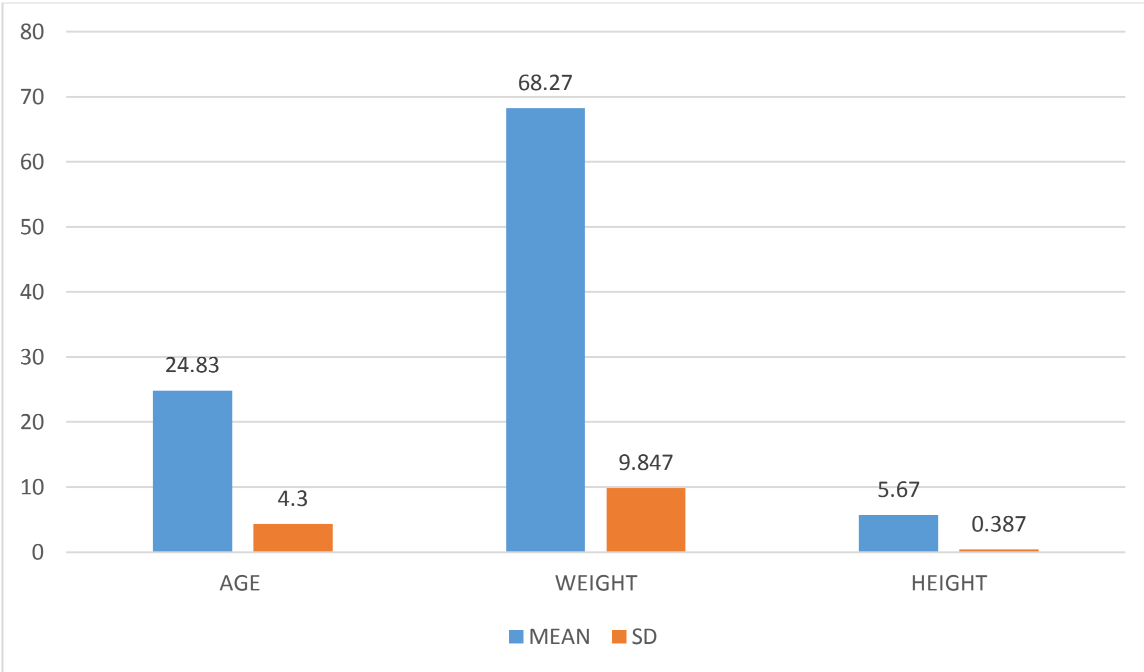
	MEAN±SD	T TEST	P VALUE
GROUP A	60.00±0.00	7.982	P<0.005
GROUP B	26.00±16.497		

TABLE NO 5.3. COMPARISON OF ROMBERG TEST OF GROUP A AND GROUP B

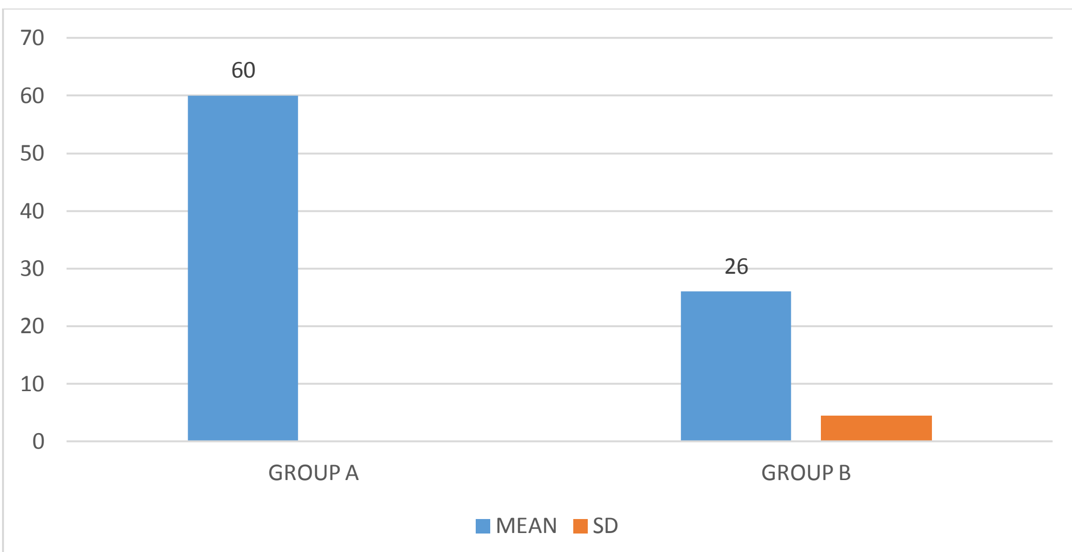
	GROUP A(n 15)	GROUP B(n 15)
THE ORIGINAL RHOMBERG TEST	**NEGATIVE-15** **POSITIVE-0**	**NEGATIVE-2** **POSITIVE-13**
RHOMBERG TEST FOOT LENGTH	**NEGATIVE-15** **POSITIVE-0**	**NEGATIVE-2** **POSITIVE-13**
RHOMBERG TEST SEMI-TENDEM	**NEGATIVE-15** **POSITIVE-0**	**NEGATIVE-2** **POSITIVE-13**
RHOMBERG TEST TANDEM	**NEGATIVE-15** **POSITIVE-0**	**NEGATIVE-2** **POSITIVE-13**

LIST OF GRAPHS:

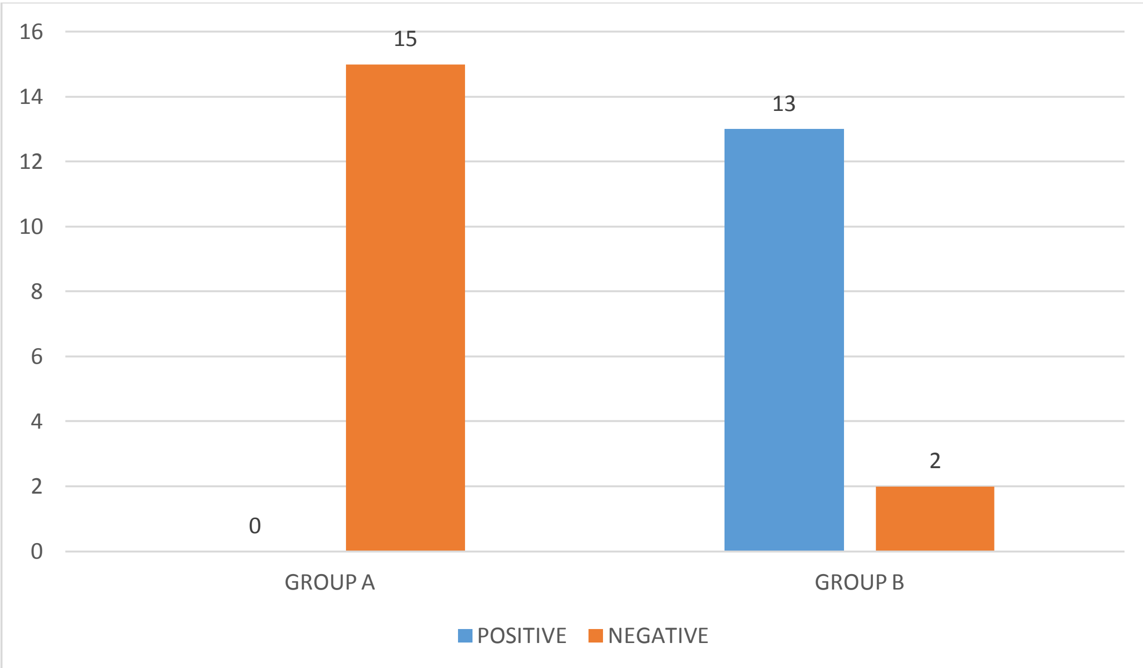
5.4 DEMOGRAPHIC DESCRIPTIVE STATISTICS OF GROUP 1 AND GROUP 2



5.6 GRAPH SHOWING COMPARISON OF MEAN OF SCORES OF GROUP 1 AND GROUP 2 (INDEPENDENT T TEST)



5.7: GRAPH SHOWING COMPARISON OF ROMBERG TEST OF GROUP A AND GROUP B



DISCUSSION

The purpose of this research was to investigate how static equilibrium is affected by vision. The goal of this research was to determine whether vision had an effect on static balance by dividing participants into two groups and comparing their balancing skills. It was found that individuals with impaired vision, group B, had a poorer balance ability than healthy ones with no visual issues, group A.

The findings of the aforementioned research are similar to those of a 2013 study by nstytut Fizjoterapii et al. With eyes closed, significant statistical changes in a large part of the measured values, as well as all of the Romberg parameters, were found. The greatest swing in the x-axis (related to range lateral stability) ($p = 0.0447$), the COP route length measured in the anterior-posterior direction ($p = 0.0251$), the average tilt COP ($p = 0.0025$), and the COP path length measured in the anterior-posterior direction ($p = 0.0251$), the average tilt COP ($p = 0.0025$), and the COP path length measured in the anterior-posterior direction (p = Furthermore, there were statistically significant variations in the average speed of a moving 2D COP (p = 0.0432) and the y-axis (p = 0.0240). Balance was less dependent on vision in the post-mastectomy group than in the control group. A post-mastectomy physiotherapy programme should include proprioceptive training with closed eyes to enhance balance response quality and postural stability (7).

Raouf Hammami and his collaborators attempted something similar. The modified clinical test of sensory interaction on balance (mCTSIB) was used to measure the velocity of the center-of-pressure (CoP) on a force platform during a 30 s bipedal quiet standing posture in four conditions: firm surface with opened and closed eyes, foam surface with opened and closed eyes. A three-factor ANOVA revealed a significant main effect for groups (F=21.69, df=2, p0.001, 2 = 0.34). There was a significant main impact of vision (F=43.20, df=1, p0.001, 2 = 0.34) and surface (F=193.41, df=1, p0.001, 2 = 0.70) in all groups, as well as a significant interaction of vision (eyes open, eyes closed) and surface (stiff and foam) (F=21.79, df=1, p=0.001) in all groups. According to the Bonferroni-Dunn post hoc test (p=0.001), rugby players exhibited superior static balance than sprinters and jumpers. Between sprinters and jumpers, there were no significant differences (p>0.05). Elite athletes' static balance is affected due to the nature of the exercise and a lack of visual control. To make choices regarding activities and sensory availability during assessment and training, coaches and strength and conditioning experts should utilise a range of exercises to improve balance, including both open and closed eye workouts on progressively challenging surfaces (16).

LIMITATIONS OF THE STUDY:

1}The sample size included in the study could have been more.

2}The physical activity performed could be more vigorous.

FUTURE RESEARCH:

1}Further researches can be done with a properly structured exercise program.

CONCLUSION

As a result of this research, it was discovered that eyesight had a major impact on static balance.

The body's equilibrium can be affected by vision.

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