Effect of Training Program on Cognitive Functions and Balance Ability among Patients undergoing Craniotomy

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Abstract:

Background: Patients undergoing craniotomy commonly experience impairments in both balance and cognitive function. **Aim of the study:** Was to evaluate the effect of training program on cognitive functions and balance ability among patients undergoing craniotomy. **Subjects and Methods; Research Design:** Quasi experimental research design was utilized to achieve the aim of the study through pre/posttest. **Setting:** The study was established in neurosurgery ICU of Accidental Hospital and neurosurgery outpatient clinics, Zagazig University Hospitals. **Subjects:** A purposive sample of 55 adult patients undergoing craniotomy during study periods. **Tools of data collection:** Four tools were utilized; Interviewing questionnaire, The Mini Mental State Examination scale, Berg Balance Scale, and Satisfaction level questionnaire. **Results**: A statistical significant improvement in all cognitive functions for studied patients regarding orientation, registration, attention and calculation, recall, and language was found post program with Mean ± SD 23.94±3.63. There was a statistical increase in mean scores of balance ability regarding standing, sitting, transfers, and turning post program than before. Also, 85.5% of studied patients were satisfied with care provided after training program. **Conclusion:** The training program had an obvious positive effect on cognitive function and balance improvement among study patients which reflected then on increasing their satisfaction level regarding care provided. **Recommendations:** The training program should be available for all patients undergoing craniotomy. Moreover, nurses should participate in training program to improve cognitive functions and balance ability among patients undergoing craniotomy.

Keywords: Balance Ability, Cognitive Functions, Craniotomy, and Training Program.

Introduction:

A craniotomy is a temporary surgical removal of a part of the skull to access the brain for various intracranial procedures. It is commonly used to treat conditions such as brain tumors, aneurysms, arterio-venous malformations, subdural empyema, subdural hematomas, and intracerebral hematomas. Specific equipment is used to extract the bone flap during the procedure [(1)].

Following a craniotomy, many patients have some degree of physical or cognitive abnormalities. Patients become more easily distracted and have slower processing speeds for information. There can be variable effects on cognitive processes like memory, focus, and attentiveness as well as fatigue. During their recuperation, a lot of patients have lightheadedness and imbalance issue [(2)]. Impaired balance might limit a patient's ability to participate in activities of daily living activities. Establishing the degree of cognitive and physical impairments is essential to develop an appropriate training program [(3)].

Training program can lower the rate of disability and enhance patients' mental health and quality of life. Restoring independence is the main goal of training program after intracranial surgery to remove a brain tumor, with a focus on mobility, daily activities of living, cognition, and communication. The training program's objectives change based on the issues that patients face. Early training is necessary to accomplish the set objectives, avoid difficulties, and produce better results [(4, 5)].

The patients during the 48 hours post craniotomy will require comprehensive multidisciplinary care. Every team member is crucial in ensuring the patient's complete

recovery as wellness counseling. Long term hospitalization, ICU experience, brain tumor craniotomy can cause physical and emotional or psychological disturbances. For patients experiencing issues in movements, the nurse should help the patient in gaining independence in daily activities like dressing, grooming, and handling small objects [6].

Patient education encompasses a series of organized educational initiatives aimed at enhancing patients' health behaviors and overall health condition. The primary goal is to sustain or enhance patient well-being, and in certain instances, to impede decline. A well-informed and educated patient is able to engage actively in their treatment, enhance results, detect potential errors beforehand, and shorten their hospital stay [7].

Nurses play a vital role post brain tumor craniotomy by offering essential information and education to both patients and their families. By doing so, nurses possess a significant capacity to enhance patient satisfaction and overall outcomes during these procedures. Properly educating patients before their surgery and assisting them in postoperative care are essential measures in reducing complications and preventing readmission [8]. The nurse assumes the responsibility of a counselor as well, attending to all the patient's concerns. This duty necessitates continuous and repetitive clarification, deciphering the patient's inquiries, and reinforcing the details of the procedure for a favorable result. Nevertheless, this entails training more personnel in an already deprived environment [9].

Significance of the study:

Craniotomy is associated with a higher incidence of morbidity, encompassing a diverse range of complications. Following the initial phase of hospitalization and rehabilitation, a significant number of individuals experience a multitude of physical, psychological, emotional, social, and spiritual health impairments upon returning to their homes [10]. The patient's ability to function independently and effectively is hindered by these disabilities [11].

Patients undergoing craniotomy often experience impairments in balance and cognitive functions. These impairments can greatly limit their ability to perform daily activities and engage in social interactions. Despite this, there have been limited studies assessing the impact of early training program on balance and cognitive functions for patients undergoing craniotomy. Therefore, this study aimed to evaluate the effect of attention training program on cognitive functions and balance ability for patients undergoing craniotomy [12]. Based on the hospital records from Neurosurgery Zagazig University Hospital for the year 2022, a total of 780 patients were admitted to the Neurosurgery Department and underwent craniotomy procedures.

Aim of the study:

Evaluate the effect of training program on cognitive functions and balance ability among patients undergoing craniotomy. This aim was achieved through the following **objectives:**

1. Assess cognitive functions, balance ability for patients undergoing craniotomy.
2. Assess patients' satisfaction level regarding training program.
3. Design, implement, and evaluate the effect of training program on cognitive functions and balance ability among patients undergoing craniotomy.

Research hypothesis

1. Mean score of patient's cognitive functions will improve after implementing the training program.
2. Mean score of balance ability will be higher after implementing the training program.

3. Patients' level of satisfaction is expected to increase after implementing the training program.

Subjects and methods

Research design:

A quasi experimental research design was utilized to achieve the aim of the study through one group pre-posttest design.

Study setting:

The study was established in neurosurgery Intensive Care Unit of Accidental Hospital and neurosurgery outpatient clinics, Zagazig University Hospitals. The neurosurgery ICU located in the fourth floor consisted of ten beds. Neurosurgery ICU beds equipped with monitors which allow nurses to observe the patient 24 hours around-the-clock.

Study Subjects:

- A purposive sample of 55 adult patients of both sex undergoing craniotomy during study periods were included, aged from 18 to 60 years, able to communicate verbally and follow commands, and free from end stage diseases.
- The sample was selected randomly. The power and sample size estimation program was utilized to compute the sample, ensuring a power of 80% at a confidence level of 95%. The size of the sample was estimated using the following formula.

$$n = \frac{N \cdot Z^2 \cdot p \cdot (1-p)}{(N-1) \cdot e^2 + Z^2 \cdot p \cdot (1-p)}$$

Tools of data collection:

First tool: An interviewing questionnaire: designed by the researchers and included the following:

- **Part 1:** Demographic characteristics of patients include age, sex, and marital status, level of education, job, and residence.
- **Part 2:** Medical history for patient: co morbidity, diagnostic test, type of tumor, previous surgery, complication, smoking, and family history.

Second tool: The Mini Mental State Examination (MMSE): It developed by **James et al.** [13]. It used to assess cognitive functions for patients. It included 11 points that tested five sections, included; Orientation (two items; each one 5 scores), Registration (one item; 3 scores), Attention and calculation (one item; 5 scores), Recall (one item; 3 scores), and Language (six item; 9 scores).

Scoring system:

The highest total score is 30. Scoring ranges from 24-30 for no cognitive impairment, 18-23 for mild to moderate cognitive impairment, and 0-17 for severe cognitive impairment.

Third tool: Berg Balance Scale (BBS). It developed by **Hong et al.** [11]. It used to measure balance ability for adults. It included 14 items; transitioning from a seated position to a standing position, standing without support, sitting without support, transitioning from standing to sitting, performing transfers, standing with closed eyes, standing with feet close together, extending arm forward to reach, picking up an object from the floor, rotating to look behind, completing a full 360-degree turn, placing one foot alternately on a stool, standing with one foot in front of the other, and balancing on one foot. Each one had five points.

Scoring system:

Scoring is based on a five-point scale, with a range from 0 to 4. A score of 0 represents the lowest level of balance ability, while a score of 4 indicates the highest balance ability. The highest possible total score is 56. Scores 41- 56 indicate a low fall risk (signify good balance), scores 21-40 suggest a medium fall risk (represents acceptable balance), and

scores 0 - 20 signify a high fall risk (indicates balance impairment).

Fourth tool: **Satisfaction level questionnaire:** It was developed by **Desoky and Fathy** [14]; **Mohamed et al.** [15]; and **Sanyang et al.** [16], and modified by the researchers. It was used to assess the patient's level of satisfaction regarding care provided after the training program. It was composed of five dimensions; Assurance (4 points), Empathy (4 points), Reliability (4 points), Responsiveness (4 points), and Tangibility (3 points).

Scoring system:

The scoring system was a 2-point Likert scale, with "Agree" assigned a value of 1 and "Disagree" assigned a value of 0. Based on this scoring system, the maximum possible score was 20. The total scores for each patient were computed, and their levels of satisfaction were then classified based on the resulting scores. These classifications were presented in both numerical and percentage formats. Patients with scores below 75% were categorized as "Unsatisfied," while those with scores above 75% were categorized as "Satisfied."

Content validity and reliability:

Content validity was employed to assess whether the modified tools and training program effectively covered their intended purpose. A panel of five experts, consisting of three nursing staff members and two neurosurgery medical staff members at Zagazig University was responsible for its development. Reliability statistics of Interviewing questionnaire, The Mini Mental State Examination, Berg Balance Scale, and Satisfaction level questionnaire, Cronbach's Alpha was 0.8, 0.91, 0.98, and 0.75 respectively.

Fieldwork

The study was conducted from beginning of December 2023 to the end of May 2024 where the researchers being present three days a week during morning and afternoon shift.

1. Assessment phase:

The tools I, II, III, and IV were utilized to conduct the initial assessment after 24 hours postoperatively before application of the training program. The MMSE scale (tool II) and the BBS (tool III) were used to measure the cognitive functions and balance ability and tool IV to assess patients' satisfaction regarding care provided. The researchers took about fifteen minutes to complete each instrument. After that, the studied patients received the training program. This phase was conducted through one month.

2. Planning phase:

The training program content was created after reviewing relevant literature [18] and analyzing the assessment phase results. Enrolled patients were given audiovisual materials in the form of a program booklet, handout, brochure, colored pictures and videos.

3. Implementation phase:

Enhancing cognitive functions and balance abilities in individuals after craniotomy was the aim of the training program. The content, intensity, and frequency of the training program are customized to meet the patients' needs. The patients were assigned to morning and afternoon shifts, with two sessions per day (one-hour for each) and 8 weeks in a total.

Under the guidance of the researchers, patients had received instruction and trained how to do exercises. To help patients finish their training program correctly and successfully and maintain a faster recovery, and family members were invited to join the sessions and receive education on the training program. Patients were directed to finish the two-month training program period by performing the exercises daily at home.

Training program:

It was created in Arabic to satisfy patients' needs for improving their cognitive functions and balance

abilities after craniotomy. It included the following:

First part: Training to improve cognitive function; consisted of the following five sections:

1. Orientation training involved assessing the patient's awareness of time, place, and self, as well as their ability to differentiate between left and right limbs, identify objects in the hospital, and gauge distances in their surroundings.
2. Attention training included engaging the patient in simple games like darts and fishing to improve their focus and concentration.
3. Calculation training aimed to enhance the patient's mathematical skills through card games and exercises.
4. Recall and memory training consisted of activities such as listening to stories, looking at pictures, memorizing numbers, reciting lyrics, and recalling recently seen objects and people.
5. Language training focuses on improving verbal expression and logical thinking by encouraging patients to listen, read, retell stories, ask questions, and discuss topics of interest.

Second part: Brain exercises involving core and balance: This improved gait and coordination. Included weight shifts, sitting trunk extension, Romberg stance, calf lifts, forward punches, staggered stance, and core toe taps. Lateral trunk flexion (also known as oblique crunches) was also included. Also, initiating mobilization within 24 to 48 hours post-craniotomy, promoting early independent ambulation, facilitating communication during movement, and fostering conversation during corridor. All of these interventions contributed to enhancing patients' balance.

4. Evaluation phase:

Patients were re-assessed using same tools used in the pretest II, III, and IV for assessing patients after two months.

Pilot study:

A pilot study was carried out with five patients to evaluate the tools in terms of clarity, relevance, comprehensiveness, understanding, applicability, and ease of implementation. The findings from the pilot study data were instrumental in refining the tools, with necessary corrections or additions made. Participants involved in the pilot study were subsequently excluded from the main study sample.

Administrative and ethical considerations:

The study received the required approvals through official procedures. The program was approved by the research and ethical committee at the Faculty of Nursing, Zagazig University. Prior to engaging with each patient, the researchers provided a detailed explanation of the study's objectives, procedures, and advantages in order to obtain verbal consent. Patients were informed of their right to decline participation or withdraw at any point, as well as the confidentiality and anonymity of their information. The study's implementation did not pose any risks; in fact, the training program had a positive impact on the participants.

Statistical analysis:

Data collection, tabulation, and statistical analysis were conducted using SPSS 20.0 for Windows (SPSS Inc., Chicago, IL, USA 2011). The quantitative data were presented as mean ± SD, while qualitative data were presented as absolute frequencies (number) and relative frequencies (percentage). The comparison between two dependent groups of categorical data was done using the McNemar test or marginal homogeneity test.

For normally distributed variables, the paired t-test was utilized to compare between two dependent groups. The Spearman correlation coefficient was calculated to evaluate

the relationship between study variables, with a positive sign indicating direct correlation and a negative sign indicating inverse correlation.

The Cronbach alpha coefficient was calculated to determine the reliability of the scales based on internal consistency. A p-value of less than 0.05 was considered statistically significant, a p-value of less than 0.01 was considered highly statistically significant, and a p-value greater than or equal to 0.05 was considered statistically non-significant.

Results:

Table 1: Reveals that 56.4% of studied patients were from urban and their ages less than 50 years old with Mean±SD 43.11±15.11. Also, 85.5% of studied patients were married, 63.6 % of studied patients were males, 72.7 % were educated and 36.4% of studied patients their job was manual work.

Table 2: Shows that 45.5 % of studied patients were diabetic, followed by hypertension. All patients do CT and MRI as diagnostic tests. Also, 72.7% of studied patients had benign tumor, only 20% of studied patients had previous surgery. In addition to 94.5% of studied patients had complications which represented in headache 63.6%, followed by drowsiness 25.5% and changes in conscious level 20.0%. Also, this table clarifies that only 29.1% of studied patients were smokers and only 3.6% of studied patients had family history.

Table 3: Illustrates that there was a statistical improvement in all cognitive functions for studied patient regarding orientation, registration, attention and calculation, recall, and language post program with Mean ± SD 23.94±3.63 with a highly statistical significant difference pre and post program (P = 0.001).

Table 4: Clears that there was a statistical increase in mean scores of all balance items post program with Mean ± SD 42.96±16.51 than before 18.60±8.37, with a highly statistical significant difference (P = 0.001).

Figure 1: Shows that balance impairment score was decreased post training program than before with a statistical significant difference (P = 0.001).

Table 5: Reveals that a statistical significant improvement in patients' satisfaction level was found regarding assurance, empathy, reliability, responsiveness with Mean ± SD 19.92±0.37 post program than before8.49±2.22. Also, there was a highly statistical significant difference (P= 0.001).

Figure 2: Illustrates that 85.5% of studied patients were satisfied with care provided after training program than before.

Table 6: Clarifies that there was a strong positive correlation between cognitive functions and balance, also there was a strong negative correlation between cognitive function and satisfaction, and between balance and satisfaction, with a highly statistical significant differences (p<0.01).

Discussion:

Regarding demographic characteristics, the study findings revealed that above half of studied patients their ages less than fifty years old and were from urban. Also, about two third of studied patients were males and educated, the majority of them were married, and more than one third of them their job was manual work.

These study finding was supported by **Hassan and Mohammed** [(17)] who illustrated that more than half the sample is men, and majority of patients were married. Similarly, with **Mohamed et al.** [(15)], and **Abdelmowla and Abd-Elmageed** [(18)] showed that more than half of subjects were males, less than half of subjects were aged between forty and fifty years and the majority the subjects were married. In the same line with **Cinotti et al.** [(19)] who reported that mean age was fifty-seven years.

Concerning medical history, this study finding illustrated that more than one third of studied patients were diabetic, followed by hypertension. All patients do CT and MRI for diagnosis. Also, more than two third of studied patients had benign tumor, only less than one fourth of them had previous surgery. Also, this table clarified that more than one quarter of them were smokers and the most of them didn't have family history of brain tumor. This study result was similar to that done by **Abdelmowla and Abd-Elmageed** [18] who stated that the majority of subjects diagnosed with benign brain tumor. In the same line with **Moniz-Garcia et al.** [20] who found that less than one third of studied patients were hypertensive. Conversely with **Hassan and Mohammed** [17] who stated that unemployed is the greater number of sample.

This study result clarified that the most of studied patients had complications which represented in headache in about two third of them, followed by drowsiness in one quarter of them and changes in conscious level in less than one quarter of them. It could be explained that, the impairment in cognitive functions, attention and recall of words may be result from these complications.

This result was supported by **Mahmoud et al.** [21] who illustrated that nearly half of patients in both groups had change in consciousness, and more than two third had persistent headache and dizziness and more than three fourth had no seizures. In consistent with **Singh et al.** [22] who stated that patients who had traumatic brain injury or intracranial surgery showed signs of cognitive impairment. Many cognitive processes, including planning, paying attention, focusing, and solving problems, are interfered with cognitive impairment.

Regarding patients' cognitive functions, this study finding revealed that there was a statistical improvement in all cognitive functions for studied patient regarding orientation, registration, attention and calculation, recall, and language post program than before with highly statistical significant difference pre and post program. This could confirm the beneficial effect of the training program as helping the studied patients to gain more attention and concentration.

This result was in agreement with **Yu et al.** [4] who reported that post-operative rehabilitation following brain tumor surgery resulted in notable enhancements in motor function, cognitive abilities, and daily living activities in the short run. In agreement with **Mohamed et al.** [23] who stated that patients in the rehabilitation group showed statistically significant improvements in their cognitive function mean scores. In congruent with **Khan et al.** [24] and **Dhandapani et al.** [25] who found that patients' cognitive performance improved after six months of intracranial surgery. Similarly, with **Abdelmowla and Abd-Elmageed** [18] who revealed that statistically significant improvement in mean scores for cognitive function (attention) was observed among patients in the rehabilitation group when compared to patients in the control group.

As regards balance ability, this study result illustrated that there was a statistical increase in mean scores of all balance items post program than before with a highly statistical significant difference. This could be due to early movement after craniotomy through the applied training program help the patients to gain their balance.

This study result supported by **Yu et al.** [4] who reported that patients who underwent brain tumor resection experienced a notable enhancement in their motor function and balance following rehabilitation. Similarly, with **Mohamed et al.** [23] who stated that there was a noticeable improvement in both groups' mean scores for balancing ability before discharge as well as one and two months after

surgery and the rehabilitation group showed significantly more progress. Consistent with **Abdelmowla and Abd-Elmageed** [18] who demonstrated that a clear enhancement in the average balance score prior to discharge, as well as at 1 month and 3 months after the surgery, in both groups.

Concerning patients' satisfaction, the present study finding showed that a significant improvement in patients' satisfaction level regarding assurance, empathy, reliability, responsiveness was found post program with a highly statistical significant difference. This might be related that the training program had a positive impact on patients by enhancing their understanding of their condition, improving their balance and performance, and boosting their confidence and satisfaction with the care they receive.

This study result supported by **Mohamed et al.** [15] who found that above half of the study subjects achieved satisfaction toward care provided after training program. Similarly, **Yu et al.** [4] mentioned that the majority of patients were satisfied with motor function and cognitive functions improvement. In the same line with **Liu et al.** [5] who found that mean score of patient satisfaction was significantly higher in the study group.

Also, this result was in consistent with **Abdelmowla and Abd-Elmageed** [18] who found that patients have expressed higher levels of satisfaction and positive views towards the comprehensive early rehabilitation program, as evidenced by improvements in attention, balance ability, and overall performance in daily activities. In agreement with **Desoky and Fathy** [14] who stated that, patients' satisfaction level was increased after nursing care protocol, attributed to the enhanced quality of care they received.

Conclusion:

Based on study results, it can be concluded that the training program had an obvious positive effect on cognitive function and balance improvement among study patients which reflected then on increasing their satisfaction level regarding care provided.

Recommendation :

- The training program should be available for all patients undergoing craniotomy.
- It is advisable to conduct further research on a larger sample size in order to attain generalizability.
- Nurses should participate in training program to improve cognitive functions and balance ability among patients undergoing craniotomy.

Table 1: Frequency Distribution of Demographic Characteristics for Studied Patients (n=55)

Demographic Characteristics	No	%
Age		
<50	31	56.4
≥50	24	43.6
Mean± SD	**43.11±15.11**	
Range	**18-60**	
Sex		
Male	35	63.6
Female	20	36.4
Marital status		
Married	47	85.5
Single	8	14.5
Education		
Educated	40	72.7
Not educated	15	27.3
Job		
Manual work	20	36.4
Office	17	30.9
Housewife	9	16.4
Pension	9	16.4
Residence		
Urban	31	56.4
Rural	24	43.6

Table 2: Frequency Distribution of Medical History for Studied Patients (n=55)

Medical history	No	%
Co morbidity		
DM	25	45.5
Hypertension	23	41.8
Renal diseases	5	9.1
Diagnostic test		
CT	55	100.0
MRI	55	100.0
Type of tumor		
Benign	40	72.7
Malignant	15	27.3
Previous surgery		
Yes	11	20.0
No	44	80.0
Complications of previous surgery		
Yes	52	94.5
No	3	5.5
If yes what are complication *:		
Headache	35	63.6
Changes in conscious level	11	20.0
Vision disorders	9	16.4
Drowsiness	14	25.5
Convulsions	10	18.2
Smoking		
Yes	16	29.1
No	39	70.9
Family history		
Yes	2	3.6
No	53	96.4

*: not mutually exclusive

Table 3: Frequency Distribution of Cognitive Functions of Studied Patients pre and post training program (n=55)

Cognitive Functions	Pre						Post						MH p-value
	Uncertain Cognitive Impairment		Mild to Moderate Cognitive Impairment		Severe Cognitive Impairment		Uncertain Cognitive Impairment		Mild to Moderate Cognitive Impairment		Severe Cognitive Impairment		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Orientation	40	72.7	6	10.9	9	16.4	47	85.5	3	5.5	5	9.1	0.001**
Registration	35	63.6	5	9.1	15	27.3	44	80.0	3	5.5	8	14.5	0.001**
Attention and Calculation	30	54.5	10	18.2	15	27.3	46	83.6	4	7.3	5	9.1	0.001**
Recall	38	69.1	11	20.0	6	10.9	44	80.0	6	10.9	5	9.1	0.001**
Language	40	72.7	2	3.6	13	23.6	50	90.9	0	0.0	5	9.1	0.001**
Total Mean ± SD			19.03±5.66						23.94±3.63				Paired t-test=-5.742 P<0.001**

MH: Marginal homogeneity test, **: statistically highly significant (p<0.01)

Table 4: Mean Scores of Balance for Studied Patients Pre and Post Program (n=55)

Items	Pre	Post	Paired t-test	p-value
	Mean ± SD			
Sitting to standing	1.54±0.71	3.29±0.99	-11.334	0.001**
Standing unsupported	1.56±0.71	3.18±1.10	10.184	0.001**
Sitting unsupported	1.58±0.65	3.21±1.11	-9.467	0.001**
Standing to sitting	1.29±0.73	3.03±1.38	9.135	0.001**
Transfer	1.25±0.67	3.14±1.28	10.554	0.001**
Standing with eyes closed	1.30±0.79	3.07±1.28	-8.777	0.001**
Standing with feet together	1.40±0.80	3.00±1.37	7.793	0.001**
Reaching forward with outstretched arm	1.16±0.73	3.05±1.32	-9.513	0.001**
Retrieving object from floor	1.38±0.75	3.09±1.19	9.539	0.001**
Turning to look behind	1.30±0.69	3.01±1.34	-8.749	0.001**
Turning 360 degrees	1.25±0.72	2.96±1.49	7.834	0.001**
Placing alternate foot on stool	1.09±0.75	3.00±1.31	-9.807	0.001**
Standing with one foot in front	1.20±0.75	3.00±1.29	9.319	0.001**
Standing on one foot	1.25±0.86	2.89±1.43	-7.627	0.001**
Total	18.60±8.37	42.96±16.51	-10.478	0.001**

**: statistically highly significant (p<0.01)

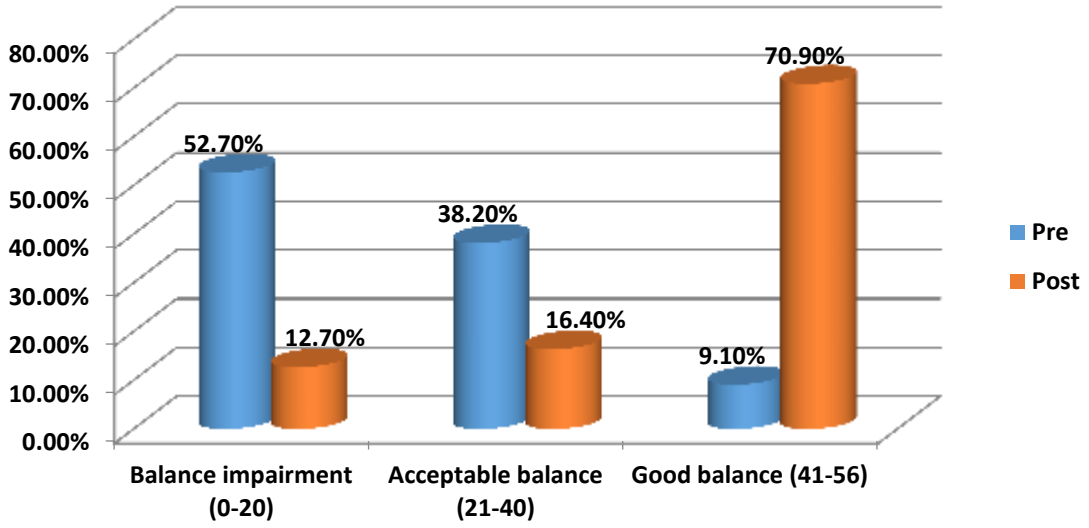

Figure 1: Frequency Distribution of Total Balance Impairment Score for Studied Patients Pre and Post Training Program (n=55)

Table 5: Frequency Distribution of Patients' Satisfaction Pre and Post Program (n=55)

Patients' satisfaction	Pre				Post				MC p-value
	Agree		Disagree		Agree		Disagree		
	No.	%	No.	%	No.	%	No.	%	
Assurance	34	61.8	21	38.2	48	87.3	7	12.7	0.001**
Empathy	35	63.6	20	36.4	47	85.5	8	14.5	0.001**
Reliability	33	60.0	22	40.0	46	83.6	9	16.4	0.001**
Responsiveness	33	60.0	22	40.0	46	83.6	9	16.4	0.001**
Total Mean ± SD	8.49±2.22				19.92±0.37				Paired t-test= P<0.001**

MC: Mc Nemar test, **: statistically highly significant (p<0.01)

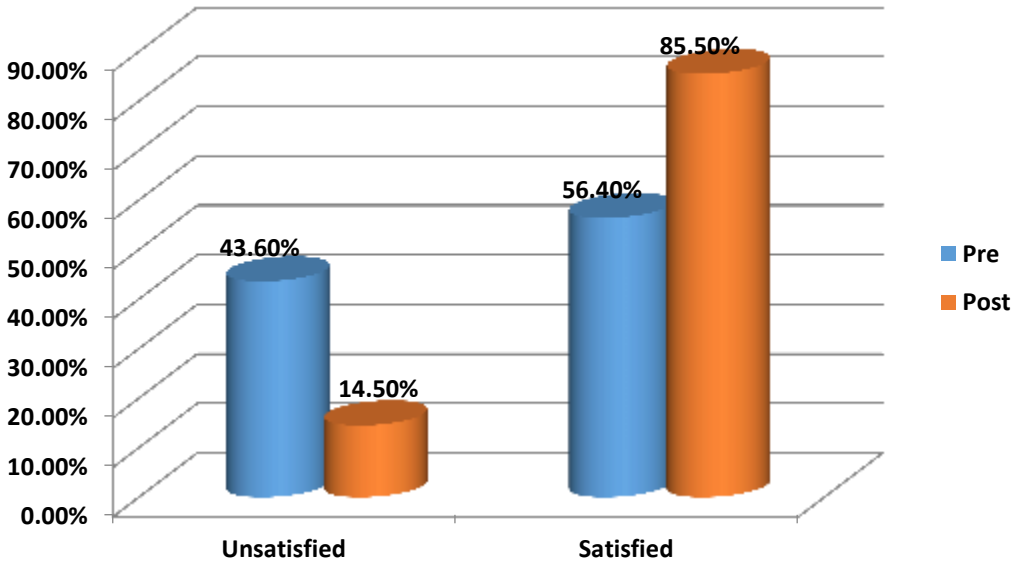

Figure 2: Patients' Satisfaction level Pre and Post Program (n=55)

Table 6: Correlation Coefficient between Cognitive Functions, Balance, and Satisfaction Level (n=55)

Scores	Cognitive		Balance	
	r	P	R	P
Cognitive				
Balance	0.610	<0.001**		
Satisfaction	-0.674	<0.001**	-0.586	<0.001**

r: correlation coefficient, **: statistically highly significant (p<0.01)

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