



Occupational Therapy

MUSIC THERAPY AS AN ADJUNCT TO SENSORY STIMULATION THERAPY PROGRAMME FOR TREATING DISORDER OF CONSCIOUSNESS IN TRAUMATIC BRAIN INJURY PATIENTS.

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ABSTRACT **Background**-Traumatic brain injury (TBI) may result in significant Impairment of an individual's physical, cognitive & psychosocial functioning. Patients frequently recover from coma, those with severe traumatic brain injury (TBI) will experience an alteration in their level of consciousness and cognitive function for period of time. **Objective -1)** To improve consciousness level, cognitive sensory recovery and minimize disability status in TBI patients with DOC. **Study Design**-Prospective , Comparative, Intervention **Methods**-: Study was conducted on 42 subjects with 21 in each group. They were allotted randomly in two groups. Control group A received sensory stimulation therapy alone and experimental group B received Music Therapy along with sensory stimulation therapy. The intervention program lasted for 4 weeks. **Result** –Results show the intra-group comparison of Control and experimental group on GCS ,WNNSP and DRS scale p value using Wilcoxon Signed rank test at week 4 0.2621,0.0019,and 0.0469 which was not significant p=0.05 at GCS scale but significant on WNNSP and DRS scale. **Conclusion** –The study concluded that improvement on recovery of consciousness, cognitive sensory recovery and minimised disability status in TBI patients with DOC.

KEYWORDS : Music Therapy, Sensory Stimulation Therapy, TBI.

INTRODUCTION:

Traumatic brain injury (TBI) may result in significant Impairment of an individual's physical, cognitive & psychosocial functioning. Patients frequently recover from coma, those with severe traumatic brain injury (TBI) will experience an alteration in their level of consciousness and cognitive function for period of time. Prolonged hospitalization, social isolation, and complete bed rest in these patients will result in reduced sensory perception secondary to reduced sensory input. It is hypothesized that applying a structured sensory stimulation program in those suffering from severe TBI would facilitate the recovery process and would prevent sensory deprivation. Sensory stimulation program may enhance recovery process. It may affect the reticular activating system (RAS), and increase arousal and attention to the level necessary to perceive incoming stimuli.

The beneficial effects of music might be also associated to its “engagement” properties. Music therapy interventions use live music that can be modified according to patient responsiveness “in the moment.” Musical parameters(e.g., tempo, rhythm) are manipulated according to changes in a patient's attention or arousal, incorporating salient content, such as the patient's name, in musical material. Salient auditory stimuli, such as family members' voices, increase the probability of observing brain and behavioral responses in DOC patients.

An attempt has been made to use Music Therapy along with sensory stimulation therapy for treating disorder of consciousness in traumatic brain injury patients.

NEED OF THE STUDY –

Road traffic crashes are the leading cause of TBI in India. At least 10% of survivors have moderate or more severe TBI-related disabilities. The patient is often in a state of consciousness disorder after severe craniocerebral trauma, and prolonged coma or deep coma often cause all sorts of complication, bring economic burden and great psychological pressure on patients' families. It could provide early benefits to patients and improve their abilities to cope with the altered life, one which will otherwise be dominated by handicap, dependence, despair and isolation. The high incidence of head injury and the increasing morbidity in young people of the detrimental effects of trauma and sensory deprivation.

AIM:

1. To compare the effect of Music Therapy along with sensory stimulation therapy with sensory stimulation therapy alone on recovery of consciousness in TBI patients.

2. To compare the effect of Music Therapy along with sensory stimulation therapy with sensory stimulation therapy alone on cognitive sensory recovery in TBI patients.
3. To compare the effect of Music Therapy along with sensory stimulation therapy with sensory stimulation therapy alone on minimizing disability status in TBI patients.

OBJECTIVES:

- 1) To improve consciousness level & cognitive sensory recovery in TBI patients with Disorder of Consciousness (DOC).
- 2) To minimize disability status in TBI patients with Disorder of Consciousness.

METHODOLOGY:

Study protocol, informed consent documents, case record form were reviewed and approved by Institutional Ethics Committee. Total number of 51 subjects were screened for the study (44 males and 07 females). Out of these 51 subjects (44 males and 7 females) were recruited for the study who fulfilled the inclusion criteria. Out of 51 subjects, due to 9 dropouts, study was conducted on 42 subjects with 21 in each group.

They were allotted randomly in two groups. Control group A received sensory stimulation therapy alone and experimental group B received Music Therapy along with sensory stimulation therapy. The intervention program lasted for 4 weeks. Patients were treated in 2 session daily for 15-30 minutes by therapist. General evaluation of the patients was done and they were evaluated at entry level and at the end of every week on outcome measure of GCS, WNSS, DRS scale.

Sensory stimulation Therapy:

1. Kinesthetic stimulation:- Movement of arms ,legs, head and trunk.
2. Tactile stimulation– Stimulation included touch, stimulation by soft brush, comb, hair brush, tip of pen or spoon and was given on bed.
3. Olfactory stimulation– Perfumes and spices, herbs, orange or lemon peels, garlic and onion.
4. Auditory stimulation- Familiar voices like ringing bell, vehicles voice, family members voice. Time
5. Visual stimulation–

Therapist or a close relative to the patient held one of the object, a family photograph, a family film, a mirror, coloured paper.

Music therapy:–

Music Therapy Program was as follows:

- 1. Baseline silence
 - 2. Live music
 - 3. Disliked music
 - 4. White noise
- Time period- 20 mins

RESULTS AND DATA ANALYSIS:

TABLE 1

	Follow up GCS				Follow up WNNSP				Follow up DRS			
	Experimental Group		Control group		Experimental Group		Control group		Experimental Group		Control group	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Day 1	5.95	1.85	5.04	1.50	16.52	5.29	20.09	4.84	23.38	2.47	25.33	2.78
Week 1	7.85	2.41	6.09	1.89	30.85	10.45	24.61	6.73	20.95	3.44	23.80	2.11
Week 2	8.80	2.58	6.95	1.65	39.90	14.38	28.57	6.77	19.42	3.45	22.19	2.11
Week 3	9.67	2.10	8.33	1.49	45.33	15.17	34.23	7.91	17.57	3.13	20.38	2.08
Week 4	10.71	2.07	9.0	1.48	54.09	18.76	40.33	11.70	15.52	3.51	19.47	2.27
F-value	43.86		47.69		63.88		44.16		61.30		41.67	
p-value	<0.0001, HS		<0.0001, HS		<0.0001, HS		<0.0001, HS		<0.0001, HS		<0.0001, HS	

The Table 1-results show that Mean and SD value of GCS ,WNNSP and DRS scale for Control Group and Experimental group. The p values in both groups are < 0.0001 which shows both groups have statistically significant improvement in GCS,WNNSP and DRS scores. It is seen that Experimental group improved better than in control group.

TABLE 2

	Follow up GCS				Follow up WNNSP				Follow up DRS			
	Experimental Group		Control group		Experimental Group		Control group		Experimental Group		Control group	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Week 1	1.90	1.78	1.04	2.03	11.33	8.86	4.52	7.27	2.42	2.37	1.52	2.58
Week 2	2.85	2.22	1.90	1.81	20.38	12.98	8.47	8.33	3.95	2.94	3.14	2.92
Week 3	3.71	2.34	3.28	1.70	25.80	13.80	14.14	9.26	5.80	3.31	4.95	2.83
Week 4	4.76	2.46	3.95	2.13	34.67	17.36	20.23	13.46	7.85	3.63	5.85	3.55
Z-value	1.450	1.5223	0.675	1.137	2.711	3.328	3.011	3.09	1.899	0.11	0.93	1.987
p-value	0.154	0.1358	0.502	0.262	0.006	0.000	0.002	0.000	0.057	0.26	0.34	0.0
	9 NS	9 NS	6 NS	1 NS	7 HS	7 HS	6 HS	19 HS	5 NS	3 NS	81 NS	469 S

Table 2- results show the intra-group comparison of Control and experimental group on GCS ,WNNSP and DRS values, using Wilcoxon Signed rank test at week 4 0.2621,0.0019,and 0.0469 which was not significant p=0.05 at GCS scale but significant on WNNSP and DRS scale.

DISCUSSION:

This study was done with an objective to improve consciousness level in TBI patients with Disorder of Consciousness.

The Table 1 results show that Mean and SD value of GCS, WNNSP and DRS for Control Group and Experimental group. The p values in both groups are < 0.0001 which shows both groups have statistically significant improvement in GCS, WNNSP and DRS scores. It is seen that Experimental group improved better than in control group. Similar results were observed in the study done by J.Sun, W.Chen in 2015. In this study of 40 cases of traumatic brain injury patients, the GCS value increased in the music group after treatment when compared to the control group. The difference between the two groups was significant (p < 0.05) (p=0.041) after 1 month post intervention. The findings are also similar to the study done by Urbenjapholet al., (2009). GCS is not highly sensitive and may have high false positive results. Judging the prognosis of comatose patients by the GCS coma scale is not enough. Therefore in this study, quantitative WNNSP has

been used as a relative power value and as an observation index to evaluate the main music stimulation effect on sensory motor behaviour responses of coma patients with TBI.

Table 2- results show the intra-group comparison of Control and experimental group on GCS ,WNNSP and DRS values, using Wilcoxon Signed rank test at week 4 0.2621,0.0019,and 0.0469 which was not significant p=0.05 at GCS scale but significant on WNNSP and DRS scale. This means that there was an improvement in patients' consciousness, level of cognitive functioning, and basic cognitive sensory recovery as time went on with larger improvements noted in the WNNSP scores in both groups. Similar results are mentioned in a study "Effect of multimodal coma stimulation on consciousness level of traumatic brain injury comatose patient" done by Megha M et al in 2013. In this study 30 comatose patients with traumatic brain injury, GCS less than 8 were divided into 3 groups randomly. Group A (n=10) received multimodal coma stimulation 5 times a day, Group B (n=10) received stimulation twice a day and group C (control group) received conventional physiotherapy twice a day. Subjects in all the three groups received treatment for 2 weeks. Results showed that a significant difference between group A & C and B & C (p<0.01). Also Similar results were observed in study done by Moattari M, Shirazi FA, et al in 2016 Results showed that 60 patients were comparable regarding their baseline characteristics, level of consciousness, level of cognitive function and basic cognitive sensory recovery determined by GCS, RLA, and WNNSP. Although both of the intervention groups of the study improved, those who received the sensory stimulation program from their families had significantly higher GCS (P = 0.001), RLA (P=0.001), and WNNSP(P=0.001) scores after 7 days when compared to the Nurse group and usual care group.

Neuroimaging studies have shown that listening to music activates a vast bilateral network related to attention, semantic processing, memory, and the sensory-motor system, also emotion. (Koelsch, 2010). Formisano et al. (2001) have used active music therapy in 34 severe brain-injured patients. This music therapy approach consisted activities related to musical improvisation between the patient and the therapist by singing or by playing different musical instruments, according to the vital functions, the neurological conditions and the motor abilities of the patients. It showed an improvement of the collaboration capacity of the patients and a reduction of undesired behaviours, such as inertia (reduced psychomotor initiative) or psychomotor agitation.

LIMITATIONS:

1. Study done on small sample size.
2. Patients included in the study were of different age groups. The mechanism of traumatic brain injury, extent and side of involvement was different. This was not considered separately.

STRENGTHS:

This study attempted to identify comparative effect of music therapy along with sensory stimulation therapy and sensory therapy alone for treating TBI patients with DOC.

CONCLUSION:

After analysing the data in light of existing literature, it can be concluded that music therapy with sensory stimulation therapy was effective treatment for improvement in consciousness, cognitive sensory recovery and minimize the disability status in disorders of consciousness.

RECOMMENDATIONS:

Study can be done on larger sample size.

The variables like, different age groups, mechanism of traumatic brain injury, extent and side of involvement can be considered to get more specific results.

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