International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

Effect of Music Therapy on Vitals and GCS Scores of Patients with Traumatic Brain Injury at ICU'S

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Abstract: ***Introduction****: Traumatic brain Injury is mainly caused by external agent or force is one of the major causes of disability with altering multiple systems functioning. The centre for disease controls (CDC) and bar evaluation calculable that approximately 1.4 million patients are hospitalized yearly for remedy concerning stressful mind damage.* ***Methodology****: It is an experimental study conducted at Parul sevashram hospital at vadodara. The 20 participants were selected using Inclusion criteria: 1)With the exact history of cranio cerebral trauma.2) Brain CT results showed that fracture of skull or intra cranial haematoma.3) Patient with acute onset trauma.4) Age criteria should be 18 to 45 years.5)The patient in persistent vegetative state for 2weeks with GCS scores more than 4 and \< 10.6) Patients who are under physiotherapy session in ICU's and the vitals and gcs score after the music intervention are documented and The SPSS version 20.0 was used for statistical analysis.* ***Results****: twenty selected patients had undergone through predefined intervention for 5 days a week for 25 minutes for 5 weeks. Mean age was 27.3 (18-40 years) and majority(75%) are male with change in SBP and DBP with a standard error of 2.18 on average and RR change with SD of 5.36 after music therapy.* ***Conclusion****: the present study shows that music therapy in TBI patient at ICU after injury it plays an important role in changing the unstable vitals parameters and also the change in Glasgow coma score after the intervention*.

Keywords: Persistent vegetative state, instrumental music, vitals, Glasgow coma scale

1. Introduction

Traumatic brain injury is one of the major frequent types of accidents in any age group. Traumatic brain injury (TBI) is one in each of the principle reasons of primary reasons of loss of life and intense disability internationally and it takes place in RTA or any pressure damage so, that mind at durations that is ensuing in damage. The occasions can be named upon direct (impact) or indirect (non-impact) contact. Traumatic brain Injury is mainly caused by external agent or force is one of the major causes of disability with altering multiple system functioning. In the USA alone, this kind of damage reasons 2,90,000 health facility admissions, 51,000 deaths, and 80,000 for right disabled survivors [1] .The centre for disease control (CDC) and bar evaluation calculable that approximately 1.4 million patients are hospitalized yearly for remedy concerning stressful mind damage [1]. After traumatic brain injury (TBI), sub cortical tissue white matter damages might induce a purposeful disconnection resulting in a dissociation of regional cerebral rate of aldohexose between the neural structure and deeper brain regions. Thus thalamic and brain stem cerebral metabolic rate of glucose may have a better relation than the cerebral cortex with depth of coma when in TBI [2]. Impairments usually are paresis, odd tone, motor feature, postural control, memory, government functions, concentration, attention, arousal levels, agitation, disinhibition, apathy, emotional liability, intellectual inflexibility, impulsivity, irritability, conversation and swallowing etc [3]. Traumatic mind harm produces numerous lesions that variety from moderate to devastating harm. Initial class usually is primarily based totally on scientific severity use of the Glasgow coma scale (GCS). An excessive TBI indicates a rating of nine or less, moderate with a rating 9-12, and mild with a rating of 12-15 [4]

The intensive care unit needs special attention because where the patients' vital functions are controlled and supported [5].Today, vital signs play an important role in the detection of patients at risk of worsening in emergency departments (ED) and ICU'S. Several steps, including repeated assessments of hemodynamic signs, would be successful due to the long stay of these patients in intensive care units (ICUs) and the need to obtain sufficient information under such circumstances. In clinical practice, the value of recording vital signs is indisputable, but understanding how best to track and interpret them and how often they should be assessed is still uncertain [6]. Music therapy lowers the blood pressure and pulse rates, steadies respiration, increases oxygen saturation and is used as a harmonious technique in patients care [7].

Use of specific music for a specific purpose is important to have a contact without any particular verbal communication [7]. Music was implemented as a rehabilitation method in recovery of head injury patients during World War 2 and then after the practice was increased in modern hospitals [8]. This habitual nature of music to decrease stress and promote emotional health has started receiving scientific evidence from studies examining the neurochemical changes that occur when hearing to or interested in music actively. The two important markers of stress regulated by the hypothalamic-pituitary-adrenal axis (HPA or HTPA), the beta endorphin and cortisol levels have been observed to decrease significantly with music intervention [9]. By listening to music of different types, music therapy has a great impact on our minds, can give relaxing or stimulating results, alleviate anxiety and depression, and enhance the quality of life [10].

The vital signs of the participants such as pulse rate, systolic and diastolic blood pressure, oxygen saturation are measured and written down before and after the procedure on vital sign forms used by nurses in ICU's [9]. Thus, the critical symptoms and symptoms manual the preliminary diagnosis and the tracking of sufferers clinical evolution. So, their predominant goal is to assist in sufferer's fitness evaluation of the person, in addition to equip the selection making method associated with unique intervention [11].

The GCS was at the beginning designed to be the standardize clinical assessments of sufferers with head trauma within side the 1970s, however is presently seemed as the most broadly used scoring system for patients with an altered arousal level [12]. Depending up on motor responsiveness, verbal performance, and eye opening to suitable stimulus, the Glasgow Coma Scale turned into designed and need to be used to evaluate the severity and length of coma and impaired consciousness. This scale assist to gauge the impact of a huge sort of conditions which include acute brain damage because of trauma and vascular accidents or infections, and a few metabolic problems as well [13].

Aim of the Study

To assess the Effect of Music Therapy on Vitals and GCS scores in Patients with Traumatic Brain Injury at ICU's.

Objectives

1) To assess the effect of music therapy on vitals as a potential intervention to improve the alterations in traumatic brain injury patients at ICU's.
2) To assess the effect of music therapy on GCS scores as a potential intervention to improve the arousal in traumatic brain injury comatose patients at ICU's.

2. Material and Methods

They are participants were selected using Inclusion criteria: 1) With the exact history of cranio cerebral trauma.2) Brain CT results showed that fracture of skull or intra cranial haematoma.3) Patient with acute onset trauma.4) Age criteria should be 18 to 45 years.5) The patient in persistent vegetative state for 2weeks with GCS scores more than 4 and \< 10.6) Patients who are under physiotherapy session in ICU's. 7) Patient's attendants who are willing to participate.8) Inform consent from the guardian. Exclusion criteria: 1) Subjects suffering with dementia, mental illness, drug abuse.2) History of hearing impairment by (ENT specialist).4) who are not willing to participate in the study. 5) Any Cardio and respiratory disorders conditions.

3. Instruments

Instruments used during the intervention firstly consent form to be signed and initial assessment will be taken on vital sign forms similarly available at nursing station at icu by pulse oximeter and sphygmomanometer and also glasgowcoma scale the total score of the scale is 15 and minimum score is 3, with 3 components there are 1) eye response, 2) motor response, 3) verbal response. Musical track designed by expert who is have a calming and relaxing effect by the use of head phones.

4. Intervention

A multiple baseline, experimental study by pre and post design was applied for both the outcomes after initial screening and signing the consent form by the patients attendant after filling the patient information sheet and music intervention of instrumental violin track was given to the patient through head phone at 60 decibels to eliminate the extraneous noise to increase the effect those who they fit in inclusion criteria and GCS score and vitals are recorded by the researcher by going to ICU for 5days a week for 5weeks to reach the number of patients as planned for the sample size .The statistical analysis was done by the paired t test to see the effect of intergroup comparison and wilcoxon signed ranks test for change in GCS scores.

5. Result

All the outcomes in the study were compared both the pre and post intervention. Regularity of them were measured and the characteristics of the age and sex were described in Table 1 with a mean of 27.30 and SD of 7.041 and frequency of the gender distribution in the study described in Fig 1.

Table 1: Characteristics of age

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Age	20	27.3000	7.04198	1.57463

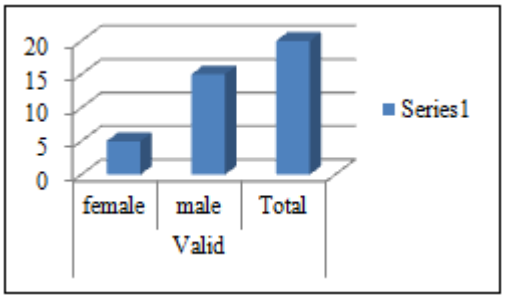

Figure 1: Frequency Gender Distribution

Total no. of sample were included in the study are 20 and among them 5 were female and 15 are male and majority of them are belongs to adult population and the changes in the vitals such as blood pressure, respiratory rate, pulse rate, saturation of oxygen pre and post 5 weeks of intervention were measured with pre and post data in Table 2.

Heart rate:

Changes in the heart rate were observed in 20 patients and they were measured by two variants such as Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP). The SBP mean value pre was 126.35 and post was 118.1 with a SD of 6.257 in post show the significant p value of 0.033 and DBP was observed that the mean of DBP was 71.8 with a standard deviation of 4.283 in post intervention shows a significant p value of 0.027 i.e. $p < 0.05$.

Respiratory rate:

According to the data changes in the respiratory rate was observed that changes are mean RR before the intervention

are decreased from an mean of 20 ± 6.92 to 17.4 ± 2.16 in post music therapy intervention with a t value 2.167 and significance was 0.043 i.e. p < 0.05 and it shows there significant decrease in respiratory rate shown in Table 2.

Table 2: Comparison of music therapy pre and post average vitals and GCS score of patients (N=20).

	Pre	Post	t	P-value
	Mean ± SD	Mean ± SD		
SBP	126.35 ± 19.53	118.1 ± 6.257	2.298	0.033
DBP	77.1 ± 9.76	71.85 ± 4.283	2.403	0.027
RR	20 ± 6.92	17.4 ± 2.162	2.167	0.043
PR	89.1 ± 12.64	77 ± 5.47	5.248	0.0001
SPO2	93.45 ± 4.91	97.2 ± 1.85	-3.684	0.002
GCS	7.15 ± 1.9	9.8 ± 1.36	z = -3.957	0.0001

Pulse rate

The changes occurred in pulse rate after the intervention with change in mean and SD from 89.1 ± 12.64 to the mean after intervention was 77 ± 5 with a significant p value of 0.0001 having better improvement after the study.

Saturation level of oxygen

The average oxygen saturation level of the patient involved in this study was 93.45 ± 4.91 before and 97.2 ± 1.85 after the intervention was considerable statistically significant with p value < 0.002 in (Table 2).

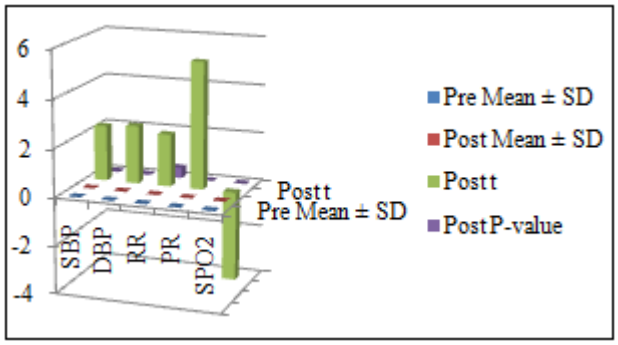

Figure 2: Comparing the value of SBP, DBP, RR, PR, SPO2 pre and post intervention with P value

Glasgow coma scale

From the above post statistical results the changes in the pre intervention mean from 7.15 ± 1.9 to 9.8 ± 1.36 post intervention by wilcoxon signed ranks test with a significant p value of 0.0001 (Figure 3) and with a z value -3.957 based on negative ranks.

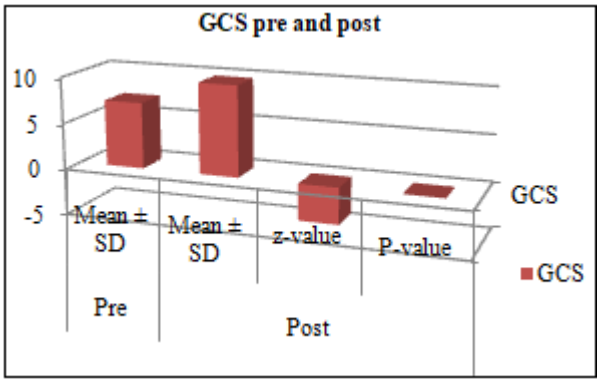

Figure 3: Characteristics of GCS pre and post

6. Discussion

In this randomized control study most of the population were young adults with in the age group of 18-40 years, and included 14 female and 34 male individuals who participated in this intervention programme. They were already treated with physiotherapy in the ICU and then they were provided with music therapy for 5 weeks. The Outcome measure that was utilized for this study was Glasgow Coma Scale score and the vitals chart. By the music therapy intervention the results of the study provides data reporting the changes that occurred in both outcomes and improves the level of consciousness with S.D + 1.21 on average and hemodynamically stabilizes the vitals with the S.D +-6.89 as recorded before the study.

In this study we found that, 5 weeks of music therapy programme showed improvement in arousal response and vital signs indicated by a better mean value and standard deviation. There are limited studies about the scientific evidence observing the effect of music therapy in head injury patients in Indian scenario. The study conducted by Ushasree Bobba et al. concluded that music therapy offered a good results to TBI patients either by passive or active ways by reducing the stress and anxiety, promoting breathing, improving attention and emotional disturbance by activating parahippocamphal areas [10].

In our study, there was an improvement in vital sings in which the less SBP was increased near to normal similarly; the DBP also followed the same trend along with SPO2 and PR as well. Moreover the high RR and PR came to approximately normal after intervention of music therapy. Similarly to our study, Seyhan et. al 2015 had also explained that the patient's blood pressure values were compared, so that high SBP, DBP and PR averages significantly were reduced by music therapy for 30 minutes with a statistical difference that was significant (p<.001). Music therapy also raises saturation (SPO2). Along with Music therapy, psychological-social intervention was also used as a non-invasive intervention for the management of several health problems. It produced many physiological and psychological changes within the patient's body affecting his own brain's limbic system [5]. Koelsch in his large scale efforts on music perception and music therapy describe some scientific perceptive of musical therapy and similarly has explained that five factors which contribute to effect of music therapy. They are attention adjustments, emotional adjustments, cognitive adjustments, behavior adjustments and communication adjustments [10].

Only few studies had been explained on the changing trends in level of consciousness then after the application of sensory stimulation programme. A case study conducted by Sosnowski and ustik in 1994 explained that there was a remarkable enhancement in level of consciousness level at 10 months after implementing a consciousness stimulation programme with a brain injury. In their study there is an improvement in functional cognitive index from 2 to 4 and also GCS scores to 9 compared with a pre score of 3-5 after 8months intervention [14]. similarly in this study there is also improvement GCS score from S.D 1.89 with a minimum of 4 before the intervention with a S.D of 1.4611 a with a

minimum of 7 improvement after the intervention of auditory stimulation by music therapy for 5 weeks duration.

The use of music as a therapeutic method which is interpreted as a catalyst of well being and promoting emotional health. This nature of the intervention reduces stress and enhances emotional health had received scientific evidence from research examining the neuro chemical changes that occurs while engaged in music actively. The two stress markers controlled by hypothalamic-pituitary-adrenal axis they are the beta endorphins and cortisol levels had been experientially decreased dominantly by music therapy. Thereby a recent review has explained the scientific work supporting therapeutic effect of music using neurochemical changes are evidence based as well as it was also hypothesized that listening to music facilitates neurogenesis or the regeneration and repair of cerebral nerves by adjusting the secretion of steroids hormones, at last finally leading to neural plasticity in brain injury patients as well [9]. There by in this study this process is undergone for better out come. In another study patients had an increased cerebral response to their own name following a music condition by okumura et. al, 2015 activates superior temporal gyri (n=21) in healthy individuals (n=2), minimally conscious patients and one in a vegetative state recovered after 4 months, suggesting music's potential prognostic capacity in improving the conscious brain activity[8].

7. Limitations

- This study was done with the age group ranging from 18-40 years and to see the definite effect the age group should be less from only one hospital.
- This study was limited with only one intervention with normal limb physiotherapy with shorter the duration of intervention.

8. Further Recommendations

Larger the sample size better results will be obtained. Due to small sample size, the result was appropriately significant; with large sample size the result will be more significant and accurate.

9. Conclusion

In this study there was a significant improvement in vitals and Glasgow coma score in patients with traumatic brain injury at ICU's. The changes in vitals and GCS Score were evident after the administration of music therapy intervention.

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