

# Effect of Music Therapy on Modulation of Attention Among Schizophrenic Patients

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## Abstract

**Background:** Attention is an important aspect of personality & activity of brain, but can be highly disrupted and disorganized in schizophrenic patients. Music can have the power to increase the attention at task and work memory.

**Aim:** To investigate the impact of receptive musical interventions on attention modulation in patients diagnosed with schizophrenia..

**Methodology:** A true experimental research design with quantitative approach was used. Through simple random sampling 40 schizophrenic clients (20 each in control & experimental) admitted in selected psychiatry hospital were selected as study sample. Study was done at CIIMHANS, Chhattisgarh.

Outcome measures included Attention by Letter Cancellation Test & Digit Span Test, Sociodemographic tool based on age, gender, occupation, socioeconomic status, educational qualification and type of schizophrenia. Receptive Music therapy was given for 1 hour/2 weeks. The ragas included were ;Raag Desh, Raag Brindavana Sarang, Raag Neelam Bari, Raag Bhopali, Raag Hamsadhwani. Post test was collected.

**Result:** Music therapy appeared to modulate the attention span of patients, as indicated by the differences between pre- and post-test scores in the experimental group. On the Digit Symbol Test (DST), the mean score increased to  $17.05 \pm 3.10$  ( $t = 1.71$ ,  $df = 38$ ,  $p = 0.094$ ), suggesting a trend toward improvement. On the Letter Cancellation Test (LCT), the improvement was statistically significant, with a mean post-test score of  $26.45 \pm 2.47$  ( $t = 16.7$ ,  $df = 38$ ,  $p = 0.00001$ ).

Additionally, attention span was found to be associated with several demographic variables: marital status ( $\chi^2 = 5.15$ ,  $df = 2$ ,  $p = 0.07$ ), gender ( $\chi^2 = 4.414$ ,  $df = 1$ ,  $p = 0.035$ ), and religion ( $\chi^2 = 5.0$ ,  $df = 1$ ,  $p = 0.02$ ).

Overall, these findings suggest that music therapy may significantly modulate the attention span of clients with schizophrenia, particularly as seen in the LCT results, despite the DST not reaching conventional levels of significance ( $p > 0.05$ ).

**Conclusion:** Therapeutic music intervention successfully increased attention span in the given study. Nursing professionals could offer Indian classical music therapy to regulate attention and alleviate negative thoughts and mental illnesses.

**Key Words:** Attention, Schizophrenia, Music Therapy, Letter Cancellation test

## Introduction

According to the World Health Organization, approximately 20 million people worldwide are affected by schizophrenia, with a global prevalence ranging from 0.3% to 0.7%. In 2017 alone, there were an estimated 1.1 million new cases reported, bringing the total number of cases to approximately 19.8 million. In Bangalore, serious mental illness cases rose from 7,601 in 2018–2019 to 10,718 in 2020–2021, as reported by Deccan Herald<sup>1</sup>

Schizophrenia is a complex and debilitating mental illness that affects nearly every aspect of a patient's life<sup>[^9]</sup>. Literature suggests that individuals at clinical high risk of psychosis demonstrate impairments in attention tasks. Compared to those with bipolar disorder, individuals with schizophrenia tend to show slightly poorer performance in attention-related domains<sup>2</sup>

Patients with schizophrenia often exhibit cognitive deficits such as impaired judgment, distractibility, impulsivity, and difficulty sustaining attention. These neurocognitive impairments hinder the ability to learn new skills or develop insights, as patients are frequently preoccupied and unable to focus<sup>3</sup>. Michael H. Thaut emphasized that diminished attention abilities are a significant challenge in psychiatric care for individuals with psychotic symptoms, often contributing to treatment discontinuation<sup>4</sup>.

While psychopharmacological treatment is a cornerstone for improving cognitive functioning in schizophrenia, its long-term use presents several limitations. These include medication resistance, noncompliance, and the emergence of adverse effects such as extrapyramidal symptoms and further neurocognitive decline<sup>5</sup>.

## Music Therapy

Musical stimulation has been found to speed up reaction times on attention tests in healthy subjects.<sup>5</sup>

**“Motifs” refer to recurrent and meaningful musical structures that may be either improvised or composed.** A recent study found that the proportion of clustered attention responses

increased significantly during interactive segments. The findings indicated that motifs had a positive impact on enhancing the efficiency of joint attention execution over time, suggesting that the child had learned to recognize and respond to these motifs<sup>6</sup>

Additionally, musical interventions can influence physiological reactions in context with nervous system, endocrine system, and cardiovascular system, these interactions lead to improved emotional states, cognitive abilities, and positive behaviors, while also promoting the balance and well-being of both the mind and body.<sup>6</sup>

The addition of background music to cognitive training programs, which are behavioral treatments meant to address attention, memory, and executive function deficits, has become quite prevalent.<sup>5</sup>

A Forensic Psychiatric Hospital conducted an RCT to test the result of music therapy on attention span of psychotic clients. Experimental group was provided 30-min musical attention control training once a week over 6 weeks' time; To gauge various attention levels, pre- and post-neuropsychological tests were done in a single-blind fashion. The experimental group outperformed the control group regarding selective, sustained, and alternating attention.<sup>3</sup>

A randomized controlled experiment (RCT) was conducted with male adults who had schizophrenia and were in forensic psychiatry. The study involved 14 participants (ranging in age from 18 to 65) and combined music therapy with MACT (CM) and improvisational music therapy (IM). The results showed that CM participants demonstrated enhancements in their abilities to maintain focused, sustained, and alternating attention. This suggests that MACT has the potential to assist individuals in forensic psychiatry with mental health issues in enhancing their skills related to sustained, alternating, focused, and selective attention.<sup>7</sup>

Literature is available on non-classical music but there is very few literature on the use of Indian classical music and the forms in which they could be implemented more effectively.

Scarcity of evident literatures gaps in India with Indian Classical Music as the intervention inspired the researchersto conduct this study to analyze the Indian ragas and their effect on Attention modulation.

Researchers hypothesized that the experimental group would show improved work-related attention, as evidenced by significant differences between pre- and post-test mean scores and corresponding *t*-values. It was further hypothesized that participants' pre-intervention attention levels would be associated with selected demographic variables. The primary aim of the study was to evaluate the effect of receptive music therapy on the attention span of clients with schizophrenia.

## Methodology

### Study Design

A true experimental study with **simple random sampling design** was selected. Modified conceptual framework Von Ludwig Bertalanffy was used for the study (Fig.1). Model is based on the distinct purpose of Perspectivism not merely Sole experience or induction<sup>10</sup>. Researchers hypothesized that with the inputs of Indian Music Therapy Attention Span can be modulated.

### Study Participantswere

40 schizophrenic clients aged between 30-50, admitted at Inpatient wards in CIIMHANS, Dewadha taluka, Distt.Rajnandgaon(Chhattisgarh). Abiding standard administrative protocol, 40 inpatients were selected through simple random sampling (lottery method). 20 each were assigned in control & experimental group

**Selection Criteria:** Following subjects were selected for studywho:

- post diagnosis has clinical symptoms of schizophrenia for more than 2 years
- are agedabove 30yrs & diagnosed mild to moderate level of Schizophrenia according to ICD -10
- agreed with a written consent, given the agreement from their parents or guardian,
- showed no immediate signs of acute psychotic symptoms and could follow verbal commands.
- did not experience difficulties in hearing and completing brief tasks.
- demonstrated proficiency in comprehending and using both Hindi and English languages.

Experimental and Control group patients were kept in different blocks for randomization purpose.. Data were assessed using self structured questionnaire and LCT, DST

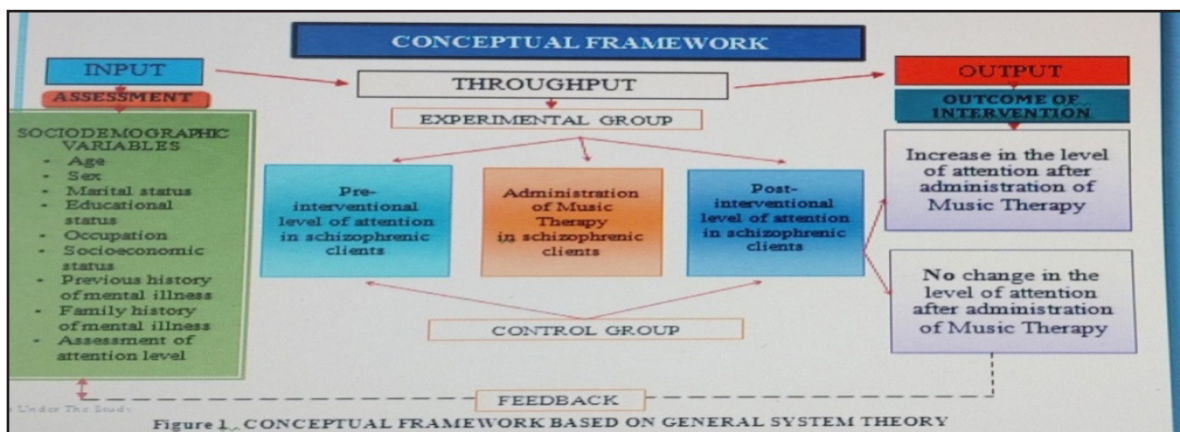


Figure 1: Modified Conceptual frameworkby Ludwig Von Bertalanffy

## Intervention

Patients in the experimental group received one hour of receptive music therapy daily, delivered through headphones. Each day, four participants were selected from the inpatient wards to undergo the session. Data collection was conducted over a period of one month to complete therapy for all 20 participants.

The sessions were held in a calm, distraction-free environment enhanced with fresh flowers, sandalwood fragrance, dim lighting, and a peaceful ambiance. Over a span of 15 days, various ragas from Indian Classical Music were used. These ragas – Raag Desh, Brindavana Sarang, Neelambari, Bhopali, and Hamsadhvani were specifically selected by music therapy professionals for their therapeutic use in managing symptoms of schizophrenia.

After each session, participants were given feedback booklets to document their responses and experiences.

These findings align with a wellness article published in an online magazine, which highlighted the positive effects of music on enhancing focus<sup>[11]</sup>. However, there remains a lack of direct literature on the impact of music therapy interventions specifically targeting attention span in individuals with psychosis.

### Tools used for Analyzing Attention were

#### 1. Letter Cancellation test (LCT)

The assignment comprises six rows, each containing 52 letters, and within each row, the target letter appears randomly 18 times.

**Scoring** - The scoring process involved deducting the count of omissions (unmarked "H"s) from the maximum achievable score of 104 (ranging from 0 to 53 on the left and 0 to 51 on the right). A higher score reflects superior performance, as illustrated in Table No.1

**Time:** Less than 5 min

## Equipment

The 11x8-inch paper consists of 6 lines, each with 52 letters. The letter "H" is presented a total of 104 times, with 53 occurrences towards left and 51 towards right.

### Interpretation of Score

**Table 1. (LCT- Score)**

CATEGORY	SCORE
Pathological	0-15
Normal	>15

### Digit Span Test (DST)

The Digit Span test assesses an individual's verbal working memory and attention. Following the examiner's presentation of a series of digits, participants are tasked with recalling the sequence until they either cannot remember the entire sequence or make an incorrect repetition.

**Table 2. Digit Span Test Table**

Digit span task -forward		Digit Span task Backward	
1.	3 8 5	1.	5 3 9
	4 9 6		7 2 8
2.	5 4 3 9	2.	4 5 6 7
	2 8 7 5		6 7 2 9
3.	5 3 5 7 2	3.	3 4 6 8 9
	6 4 7 8 9		2 3 4 5 6
4.	4 5 8 9 2 3	4.	2 4 5 6 1 3
	3 1 2 4 5 1		6 3 2 4 8 2

### Calculation

It was determined by adding together the longest uninterrupted sequence of correctly repeated digits across two trials in both the forward and backward conditions.

### Application

Participants were instructed to replicate the digits sequential and reverse in two trails, after the researcher as depicted in Table no.2

### Interpretation of Score

**Table 3. (DST-Score)**

CATEGORY	SCORE
Abnormal	<5
Normal	>6

### Ethical Consideration

Following standard process ethical permission from Hospital authorities of CIMHANS, Devadha Chhattisgarh was obtained and data collection from 8.3.20 to 23/3/20 was permitted on patients and relatives were taken for the study

### Result

**Section 1:** The details of each group were summarized in Table No. 4. There were no notable distinctions between the groups in terms of demographic or clinical attributes.

$$n_c = 20$$

$$n_e = 20$$

**Table 4. Distribution of subjects with Sociodemographic variables**

Sl. No.	SOCIODEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
		$n_c$	%	$n_c$	%
1.	<b>AGE</b>				
	30-39	5	25	4	20
	40-49	9	45	9	45
	50-59	6	30	7	35
2	<b>GENDER</b>				
	MALE	8	40	9	45
	FEMALE	12	60	11	55
3	<b>MARITAL STATUS</b>				
	SINGLE	8	40	8	40
	MARRIED	11	55	10	50
	DIVORCED	1	5	2	10
4	<b>RELIGION</b>				
	HINDU	20	100	20	100
	CHRISTIAN	0	0	0	0
	SIKH	0	0	0	0
	MUSLIM	0	0	0	0
5	<b>EDUCATIONAL QUALIFICATION</b>				
	ILLITERATE	2	10	4	20
	PRIMARY	3	15	2	10
	SECONDARY	5	25	5	25
	HIGHER SCHOOL	4	20	2	10
	HIGHER SECONDARY	2	10	4	20
	GRADUATE	4	20	3	15

Continue....

<b>6</b>	<b>OCCUPATION</b>				
	STUDENT	3	15	2	10
	GOVT JOB	2	10	3	15
	PVT JOB	8	40	7	35
	FARMER	7	35	8	40
<b>7</b>	<b>SOCIO ECONOMIC STATUS</b>				
	LOW	4	20	5	25
	LOWER MIDDLE	5	25	4	20
	HIGHER MIDDLE	6	30	5	25
	HIGHER	5	25	6	30
<b>8</b>	<b>PREVIOUS HISTORY OF PSYCHIATRIC ILLNESS</b>				
	YES	11	55	12	55
	NO	9	45	8	45
<b>9</b>	<b>TYPES OF SCHIZOPHRENIA</b>				
	PARANOID	9	45	10	50
	UNDIFFERENTIATED	2	10	2	10
	RESIDUAL	4	20	3	15
	SIMPLE	5	25	5	25
	<b>TOTAL</b>	<b>20</b>	<b>100</b>	<b>20</b>	<b>100</b>

**Section 2:** Music therapy was found to be effective in increasing attention span in clients of experimental group as evident with differences between mean post test scores in experimental and control groups as represented in Table no.5

**Section 3 :** Gender( $df=1, p=0.035, \chi^2=4.414$ ), marital status( $df=2, p=0.07, \chi^2=5.15$ ), religion( $df=1, p=0.02, \chi^2=5$ ) among experimental group and control group of schizophrenic clients were associated at ( $p<0.05$ ) with the attention scores.

**Table 5. Effectiveness of Music therapy**

VARIABLES UNDER STUDY PRE -TEST		MEAN		SD		t TEST	df	INFERENCE
		POST TEST	PRE-TEST	POST TEST				
DIGIT SPAN TEST	Experimental Group	15.1	17.05	3.3034	3.1019	3.4186	38	Not Significant At $p>0.05$
	Control Group	15.25	14.5	3.32603	3.5425	1.714	38	Significant At $p>0.05$
LCT	Experimental Group	24.85	26.45	2.7069	2.47835	16.744	38	Not Significant At $p>0.05$
	Control Group	21.5	21.95	2.4186	2.5391	8.8716	38	Significant At $p>0.05$

## Discussion

- Subjects among both the groups were majorly farmers (40%), of higher middle income group (30%), were paranoid (45%), were females 12(60%) in experimental and 11 (55%) in control group. All were Hindu, married (55%), secondary qualified (25%), aged between 40 to 49. Supported by similar study conducted among schizophrenic patients where the literacy level was high with 65.5% of the respondents having completed high school education.<sup>7</sup>
- Similar results were observed where the study included individuals aged over 40 years, with a significant emphasis on paranoid schizophrenia as the primary subgroup.<sup>8</sup>
- **Modulation in attention span and the effectiveness of music therapy in the experimental group were evidenced by a significant difference between mean pre-test and post-test scores on both the Letter Cancellation Test (LCT) and Digit Symbol Test (DST), as presented in Table 5.** These findings are supported by a similar study that examined the impact of musical activities on attention in individuals with schizophrenia. That study, which also focused on an experimental group, reported a statistically significant improvement in processing speed following the intervention, indicating that music had a meaningful effect on cognitive functioning ( $p < 0.05$ )<sup>[9]</sup>
- Schizophrenia was found to be more prominent among married females and belonging to Hindu religion Gender ( $df=1, p=0.035, x^2=4.414$ ), marital status ( $df=2, p=0.07, x^2=5.15$ ), religion ( $df=1, p=0.02, x^2=5$ ) variables among schizophrenic clients were found associated ( $p < 0.05$ ).

## Conclusion

The experimental group demonstrated an improved attention span following the music therapy

sessions, as compared to the control group. This positive change was attributed to the use of Indian ragas in a receptive form, with few variations in music streams, nurses should be trained in such therapies as they serve round the clock and are easily approachable.

Psychopharmaceutical drugs help the clients but the side effects and cost bearing is too high.

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