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Effect of Sensory Integration Activities on Reaction Time among Schizophrenics

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Abstract: ***Objective: The purpose of the study was to evaluate effect of sensory integration activities on reaction time among schizophrenics. Methods: Totally 30 schizophrenic subjects were conveniently, 15 in experimental group and 15 in control group. Reaction time has been measured for both group. Sensory integration activities given to the experimental group along with their medication and control group maintained only with regular medications. Post test have been done for both the group. Results: Paired and independent 't' test used to measure the outcome. Result indicates experimental group has significant improvement than control group on reaction time. Conclusion: Sensory integration activities on reaction time have statistically significant effect on schizophrenics.***

Keywords: Schizophrenia, Reaction Time and Sensory Integration Activities

1. Introduction

Schizophrenia, which is seen as a condition so detrimental to survival[16] for long time, is characterized by Cognitive impairment. This impairment is normally seen even in the simplest tasks requiring little to cognitive processes with no intergroup differences in reaction time. It is highly prevalent in adults with schizophrenia and has been found in adolescents who later come to develop the disease [21] Typically those with schizophrenia demonstrate the greatest deficits in cognitive speed followed by schizo affective disorder and bipolar disorder respectively[11]

Schizophrenia affects around 0.3–0.7% of people at some point in their life, or 24 million people worldwide as of 2011 (about one of every 285)[29]. By using precise methods in its diagnosis and a large, representative population, schizophrenia seems to occur with relative consistency over time during the last half-century[9].Schizophrenia is diagnosed 1.4 times more frequently in males than females, and typically appears earlier in men[22]—the peak ages of onset are 20–28 years for males and 26–32 years for females[4]. Onset in childhood is much rarer[10], as is onset in middle- or old age.

Sensory processing deficits, first investigated by Kraepelin and Bleuler as possible pathophysiological mechanisms in schizophrenia[5], are now being recharacterized in the context of our current understanding of the molecular and neurobiological brain mechanisms involved. Deficits in sensory processing underlie more complex cognitive dysfunction and are in turn affected by higher-level cognitive difficulties.

Sensory function has a role in treatment. Most closely related management is MOHO, behaviour therapy, sensory integration therapy, and psycho education and relaxation techniques.

Reaction Time is thus an integrated index of deficits in cognition. RT indicates Perceptual processes, memory retrieval, attention[6] and change-of-direction speed in multi directional activities[12] RT also has therapeutic significance by supporting the practice of activity analysis and gradation along the complexity dimension in occupational therapy[13]

Normally RT has been studied using visual or auditory stimuli though RT is involved in every sensory response. Available studies indicate significance of RT in schizophrenics. Probably, it could be due to that patients underestimated movement time on more demanding trials, although there was no link to disease-related cognitive dysfunction. Task performance was modulated by symptom manifestation.

Reaction Time is not singularly improved in other interventions such as chemotherapy, psychotherapy, and community based therapies. Occupational Therapy gives hope to try to tap Reaction Time with sensory integration activities.

There is accumulating evidence that many persons with schizophrenia have signs of sensory integrative dysfunction (e.g.,Endler&Eimon, 1978; Huddleston, 1978; Leach, 1960; Myers, Caldwell & Purcell, 1973). They are not able to process and use sensory information well.

Although it is important to document changes in sensory integrative status as a result of treatment employing sensory integrative techniques, the real goal of occupational therapy is functional improvement, or the therapeutic criterion. Ayres (1972, 1979) emphasized the value of sensory integrative treatment for its ability to influence brain functioning which in turn facilitates purposeful interaction with the environment.

2. Need of the Study

Schizophrenics suffer from slower than normal comparison subjects on a range of reaction-time tasks. So sensory integration activities can be helpful for improving the reaction time. So there is a need to explore the relationship

between sensory integration activities and Reaction time in Schizophrenics.

Aim

The aim of the study is to find out the effectiveness of sensory integration activities on reaction time among schizophrenics.

Objectives

- To assess the Reaction time among schizophrenics.
- To evaluate the effect of sensory integration activities in schizophrenia.
- To assess the reaction time in visual stimuli.
- To assess the reaction time in auditory stimuli.

Alternate Hypothesis

Sensory Integration Activities on Reaction Time will have a significant effect on schizophrenia.

Null Hypothesis

Sensory Integration Activities on Reaction Time will have no significant effect on schizophrenia.

3. Review of Literature

Ridha Aouadi1, Tim-2015[3]

They conducted study on impact of physical exercise on reactive time and cognitive function in mentally deficient adolescents. The study is made of 51 male adolescents, aged 14 to 16 years were divided into three groups: (1) healthy group (HG: 17 healthy school children without any mental deficiency), (2) a trained group (TG: n=17) that participated in an aerobic programme, consisting of one daily session (~60 min),twice weekly, during a period of three months, and (3) a sedentary group (SG: n=17, that performed no training). HG and TG were participants with mild mental deficiency. The results showed significant differences ($p<0.001$) in reaction time between SG and TG in the different time periods. In addition, the mean of reaction time in TG was similar to that observed in HG.

Jinoos Jadidi,1 and Mina Sadat Mirshoja-2016

They conducted a study on the impact of the sensory integration approach on positive and negative symptoms in a patient with non-paranoid schizophrenia in the year of 2016. In this study the treatment involved eight sessions held 3 days a week and lasting 45 minutes each. Sensory integration therapy in these patients focused on the following elements: vestibular and proprioceptive senses, exercises to improve walking, improving upper extremity coordination and movement, writing activities, cognitive skills, activities of daily living, and family therapy. After eight sessions, increased awareness of the environment, improved posture and gait pattern, improved motivation and enjoyment, improved patient tolerance, improved appearance and personal hygiene, loss of purposeful behaviour, a realistic plan of action every day, improved attention span, improved decision-making skills, and improved community involvement and coping skills were achieved.

Val Jorstad, Donald E et. al (1977)[28]

They described the postural abnormalities and sensory-integration deficits of process schizophrenics, or those who have had problems since childhood and who gradually slip into psychosis. At discharge the six participants had improved, and their gains were maintained at one-year follow-up. The authors believe similar programs would be useful in board-and-care homes and long-term-care facilities.

Stevenh. Jones, David et. al (1991)[25]

In this study they have selected 34 normal and 30 schizophrenia (19 chronic and 11 acute) subjected were tested for RT. Each received 89 trails of visual stimulus. Result found that, over all chronic schizophrenia respond more slowly than either of the other group.

Judith E. Reisman, PhD, OTR & Anne B. Blakeney, MSOT, OTR, FAOTA (2015) [19]

They conducted a study on exploring sensory integrative treatment in chronic schizophrenia. The purpose of this study was t o investigate the effect of sensory integrative treatment activities on psychiatric status and physical functioning in persons with chronic schizophrenia. An investigation of the efficacy of sensory integrative treatment on the psychiatric status and physical functioning of patients with chronic schizophrenia is reported. Patients were involved in sequenced sensory integrative treatment over a seventeen week period. Significant improvement was found in scores on the NOSIE- 30 as well as on some of the usual indicators of sensory integrative status: thumb-finger opposition, diadochokinesis, eye pursuits and balance. Length of treatment time was linearly related to amount of improvement.

R. Hayes (2014)[23]

He was conducted a study on occupational therapy in the treatment of schizophrenia. In this study he was identified four loosely defined treatment categories of schizophrenia: (1) sensory integration, (2)activity groups, (3) social skills training, and (4) living skills training. From available data it appears that sensory integration therapy has been able to improve the motivation and affect of schizophrenic patients and structured activity programs can contribute to a reduction in positive syrnptomatology. Social and living skills training show promise as treatment methods to promote the community functioning of this population. Afuture need to establish which schizophrenic patients and what schizophrenic symptomatology respond to different types of treatment is identified.

Anne B. Blakeney et. al (1983)[2]

They published an article on American journal of occupational therapy (AJOT) in the year of 1983 under the topic of" Exploring sensory integrative dysfunction in process Schizophrenia". The study resultsthe effects of sensory integrative activities on a group of seven chronic non paranoid schizophrenic adults were compared to the effects of sedentary activities in a control group of seven similar subjects. The effects of each therapeutic approach were evaluated by measuring the patients' performance in several areas using the Nurses Observation Scale of Inpatient Evaluation 30 (NOSIE-30), The Object

Manipulation Speed Test, a gait analysis, and grip strength. The results indicated general Improvement in the experimental group. Behaviours measured by the NOSIE-30 showed the most significant improvements. The control group showed isolated improvements in grooming (measured by the NOSIE-30) and in right-hand use (measured by The Object Manz1mlation Speed Test). These findings suggest that 6 weeks of sensory integrative activities can improve the overall functioning of chronic non paranoid schizophrenic patients, facilitate their adaptive responses, and enable them to participate more fully in other areas of therapeutic intervention.

J. H. Court and e. Garwoli (1968)[15]
They have conducted a study on Schizophrenic Performance on a Reaction-Time Task with increasing Levels of Complexity. An experiment was conducted involving varying complexities of reaction-time (RT) task. A group of twenty-four thought-disordered schizophrenics was carefully matched with Normal's for age and sex. It was found that with increasing task-complexity the level of schizophrenic performance deteriorated linearly rather than exponentially. Attention was paid to the paranoid/non-paranoid dichotomy and the influence of medication. Interpretation is in accord with Yates' theory that complexity of information input does not produce a greater deficit among schizophrenics, unless presented under conditions where there is continuous pressure to respond.

Hayes (1989)
Concluded that sensory integrative treatment did not have an impact on sensory integrative functioning but resulted in improved motivation and affect, however her conclusions are drawn upon an incomplete review and analysis of the studies available.

Study Design
The study is done with two groups pre-test and post-test of quasi experimental design (Pre-Post experimental design)

Experimental group
Sensory integration activities

EG (pre test) ⟶ post test

Control group:

CG (pre test) —Medicines only⟶ post test

Sample Size
Total numbers of consecutive samples of 30 subjects were taken in this study. The subjects were divided into two groups as experimental and control group. The control group consists of 15 subjects, and experimental group consist of 15 subjects.

Sampling Technique
Convenient sampling technique was adopted.

Study Place
Annai JKK sampooraniammal home for mentally ill.

Duration of the Study
Duration of the study is one year

Selection Criteria

Inclusion Criteria
- Participants with schizophrenia between ages 20 to 35 years.
- Both male and females
- Participants with insight grade 3 to 5
- Patients intact in vision and hearing.

Exclusion Criteria
- Age should not be more than 35 and less than 20 years
- Participants with chronic schizophrenia
- Participants with insight grade less than 3
- Patients with impaired vision and hearing

Variables

Independent Variables
Sensory integration activities.

Dependent Variables
Schizophrenia ,Reaction time

Description of the instrument
Reaction time Apparatus

4. Procedure

A total of 30 subjects were taken in this study. The subjects were selected from the age group between 20 to 35 yrs already diagnosed as Schizophrenia by a psychiatrist with good vision and hearing.

The subject is divided in to two groups; a control group and an experimental group in control group consist of 15 subjects and experimental group also consist of 15 subjects, were taken from Annai JKK sampoorani Ammal home for mentally ill. The control group received only medication and the experimental group underwent sensory integration activities along with medical treatment.

The pre test was conducted both groups before the intervention by Reaction time apparatus. It is used to measure the reaction time in response to visual stimulus and auditory stimulus. Subjects were tested in a quiet room. Subject sit 45 cm away from the apparatus and respond in the button box were eliminated by the index finger. Sensory integration activities was provided in 6 days a week and lasted 1 hour each. This have been used for 2 month duration contains 50 sessions. Written consent was obtained from the participant during the first session of treatment, during which the purpose of evaluation and treatment was explained.

Training sessions- Experimental group
- Intervention period- 2 month
- In experimental group intervention that took place 6 days a week and Lasted 1 hour each
- Total number of sessions- 50 sessions.

Sensory integration activities sessions			
S. No.	Sessions	Sensory integration activities	Outcome
1	Total No. of sessions is 50 (2 month duration) Each sessions will 1hour per day	Walking in a spiral pattern Walking on treadmill	Improve the balance
2		Hopping & Skipping	
3		Jumping over obstacles	
4		Darts Ping- Pong	Improve the Shoulder and Neck ROM
5		Catching & Throwing a ball	To improve posture abnormality
6		Fine motor activities • Finger painting • Writing • Beads sorting	Improve the fine motor skills & coordination

5. Data Analysis and Interpretation

Table 1: Un Paired‘t’ test between the pre test of experiment and control group using reaction time in visual stimuli.

Visual	Test	Mean	S.D value	‘t’ value	‘p’ value
Control Group	pre test	0.939	0.153	1.698	P>0.05
Experimental Group	Pre test	0.841	0.163		

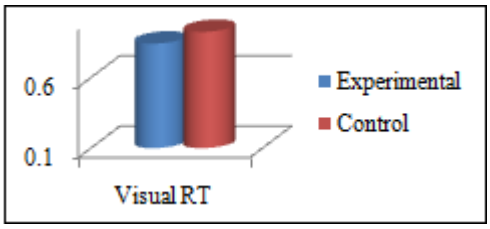
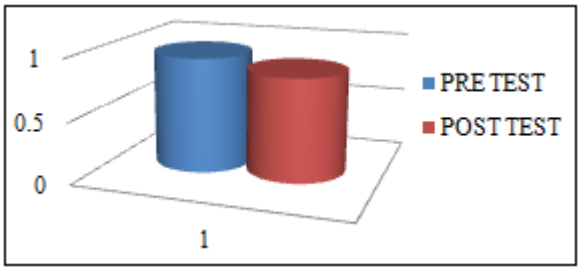


Table 1 and graph 1– There is no significant statistical difference between the two groups

Table 2: Paired‘t’ test between the pre and post control group on reaction time in visual stimuli

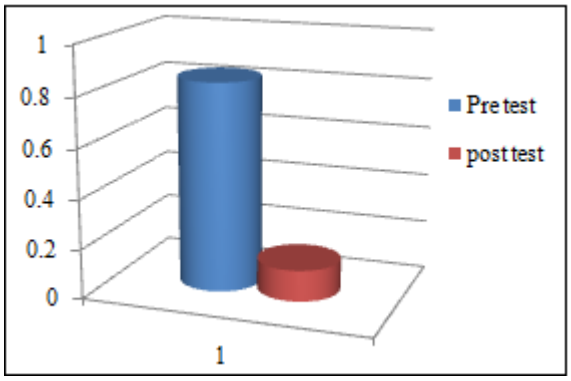
Visual	Test	Mean	S.D value	‘t’ value	‘p’ value
Control group	Pre test	0.939	0.153	1.879	P>0.05
Control group	Post test	0.926	0.155		



As seen in the table 2 and graph 2 the p value is 0.0813 which is not quite significant.

Table 3: Paired ‘t’ test between the pre and post experiment group using reaction time test in visual stimuli

Visual	Test	Mean	S.D value	‘t’ value	‘p’ value
Experimental Group	Pre test	0.841	0.163	12.66	P<0.05
Experimental Group	Post test	0.653	0.126		



As seen in the table 3 and graph 3 the p value is <0.0005 considered to be extremely Significant, it indicate improvement in visual reaction time of experimental group.

Table 4: Un Paired ‘t’ test between the post test of experiment and control group using reaction time in visual stimuli.

Visual	Test	Mean	S.D value	‘t’ value	‘p’ value
Control Group	Post test	0.926	0.155	5.66	P<0.05
Experimental Group	Post test	0.653	0.126		

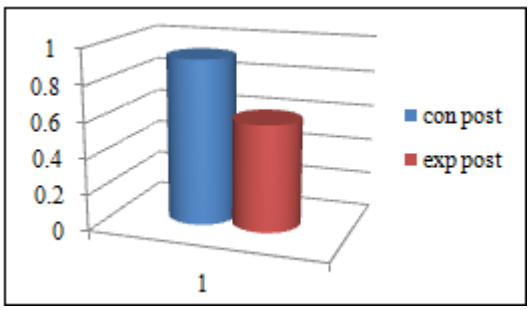


Table 4 and Graph 4 – There is a significant statistical difference between the two group i.e. post control and post experimental group indicate more statistical improvement in post experimental group compared to post control group.

Table 5: Un Paired‘t’ test between the pre test of experiment and control group using reaction time in audio stimuli.

Audio	Test	Mean	S.D value	‘t’ value	‘p’ value
Control Group	Pre test	0.645	0.083	1.785	P>0.05
Experimental Group	Pre test	0.557	0.172		

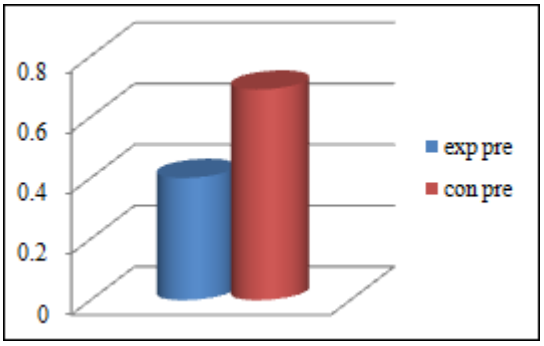
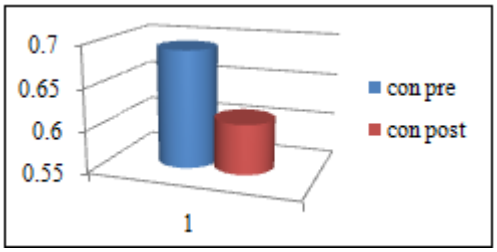


Table 5 and graph 5 – There is no significant statistical difference between the two groups.

Table 6: Paired 't' test between the pre and post control group on reaction time in audio stimuli

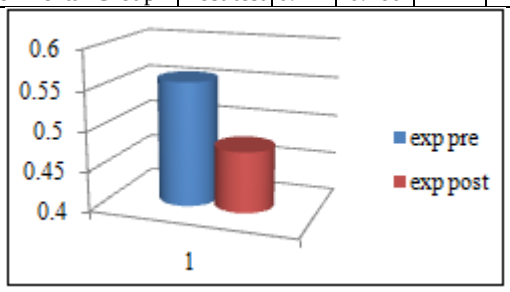
Audio	Test	Mean	S.D value	't' value	'p' value
Control group	Pre test	0.650	0.092	0.2487	P>0.05
Control group	Post test	0.645	0.083		



As seen in the table 6 and graph 6 the p value is 0.8072 which is not quite significant. So it indicates no improvement in audio reaction time of control group.

Table 7: Paired 't' test between the pre and post experimental group on reaction time in audio stimuli

Audio	Test	Mean	S.D value	't' value	'p' value
Experimental Group	Pre test	0.557	0.172	5.317	P<0.05
Experimental Group	Post test	0.477	0.160		



As seen in the table 7 and graph 7 the p value is <0.0001considered to be extremely significant, so it indicate improvement in audio reaction time of experimental group.

Table 8: Un Paired 't' test between the post test of experiment and control group using reaction time in audio stimuli.

Audio	Test	Mean	S.D value	't' value	'p' value
Control Group	Post test	0.645	0.083	5.66	P<0.05
Experimental Group	Post test	0.477	0.160		

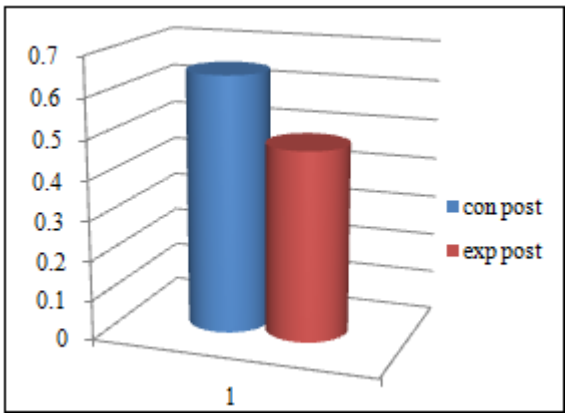


Table 8 and graph 8 – There is a significant statistical difference between the two group i.e. post control and post experimental group indicate more statistical improvement in post experimental group compared to post control group.

Statistics used:
Independent and paired 't' have been used to analyse the data.

6. Discussion

The aim of the study was to find out the effectiveness of sensory integration activities on reaction time.

A total of 30 schizophrenic patients were selected and conveniently allocated to the experimental and control group, till the number of 15 subjects were reached each group, matched for age, insight and duration of illness.

The levels of reaction time both experimental and control group measured by reaction time aparatus, the experimental group alone underwent sensory integration activities for a period of two month. The post test evaluation was done and the results were analyzed by t test and score were tabulated.

In table 1 and graph 1 shows the reaction time in visual stimuli between control and experimental group in pre test. The mean value of control group is 0.939 and mean value of experimental group is 0.841 and t value is 1.698. It shows the homogeneity.

In table 2 the Paired t test results of control group in visual stimuli indicates no significance in the pre and post test values (t value is 1.879; p value >0.05). Hence it indicates that there is no change in reaction time in control group as they have not received sensory integration

In table 3 the Paired t test results of experimental group in visual stimuli indicates significance in the pre and post test values (t value is 12.66; p value <0.0001). Thus the experimental treatments given to the experimental group members are found to hold good and well differentiate the experimental group from control group.

This finding also supported by related research by RidhaAouadi, Homoud Mohammed Nawi Alanazi1 and Gabbett Tim- 2015, theysuggests that three months of regular exercise training significantly improved reaction time and consequently the cognitive function in mild

mentally deficient adolescents. Physical activity seems to be an indispensable means of improving performance of cognitive activity in adolescents with mild mental deficiency.

In table 4 the unpaired t test results of post test between control and experimental group of visual values (t value is 5.66; p value <0.05). It indicates that sensory integration activities interventions have significant effect on reaction time for visual stimuli.

In table 5 and graph 5 shows the reaction time in auditory stimuli between control and experimental group in pre test. The mean value of control group is 0.645 and mean value of experimental group is 0.557 and t value is 1.785. It shows the homogeneity.

In table 6 the Paired t test results of control group in auditory stimuli indicates no significance in the pre and post test values (t value is 0.248; p value >0.05). Hence it indicates that there is no change in reaction time in control group as they have not received sensory integration.

In table 7 the Paired t test results of experimental group in auditory stimuli indicates significance in the pre and post test values (t value is 5.317; p value <0.05). Thus the experimental treatments given to the experimental group members are found to hold good and well differentiate the experimental group from control group.

In table 8 the unpaired t test results of post test between control and experimental group of auditory values (t value is 5.66; p value <0.05). It indicates that sensory integration activities interventions have significant effect on reaction time for visual stimuli.

The values are significant statistically and the findings are in line with the earlier researchers who found sensory integration therapy effective in schizophrenia.

Thus the null hypothesis has been disproved and alternative hypothesis has been proved.

7. Conclusions

- Sensory integration therapy has been found effective in improving visual RT of schizophrenics
- Sensory integration therapy has been found effective in improving Auditory RT of schizophrenics
- Null hypothesis has been disproved

8. Limitations

- The study has been conducted in a small group
- The study has been conducted in a single geographic location
- The study included sample selected based on convenient sampling

9. Recommendations

Based on the findings of this study it is recommended that:

- Sensory integration therapy can be used for improving the visual RT of schizophrenics.
- Sensory integration therapy can be used for improving the Auditory RT of schizophrenics.
- The study needs to be replicated with schizophrenic groups of wider demography and duration apart from different diagnoses.

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