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Effect of Auditory Integration Training on Hyperacusis among Children with Autism at a Selected Special School, Coimbatore

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Abstract
An interventional study was conducted to assess the effect of Auditory Integration Training on hyperacusis among children with autism, at Jeyam special school, Coimbatore. One group pretest post test pre experimental design was used to conduct the study. A purposive sample of 27 children with autism who had hyperacusis was included in this study. Pre assessment on the level of hyperacusis was done by using modified sensory profile questionnaire for children with autism. Auditory integration training was administered by the researcher to each child for a period of ten days. The post test was done using the same tool at the end of the intervention. The obtained data were analyzed using paired't' test. It was identified that, the mean level of hyperacusis before and after auditory integration training was 34.52 and 25.63, with a standard deviation of 9.44 and 9.04 respectively and the mean difference was 8.89. The calculated 't' value was 13.66. The result revealed that there was a significant reduction in hyperacusis after the implementation of auditory integration training. Hence, it was concluded that, auditory integration training was effective in reducing hyperacusis among children with autism.

Keywords: Autism, Hyperacusis, Auditory Integration Training.

Introduction

"Music speaks what cannot be expressed, soothes the mind and gives it rest,
Heals the heart and makes it whole, flows from heaven to the soul."

- Anon

A newborn baby is like the beginning of all things, the wonder, hope and dream of possibilities. Most children are welcomed as a gift by their parents. But when a child is born with a significant disability, some parents may experience emotions of conflict. These children cannot achieve their full potential for growth, intellectual, behavioral and social development, because of pathological limitations (Yadav, 2011).

The term "autism" refers to a cluster of conditions appearing early in childhood. Autistic disorder is characterized by symptoms from each of the following three categories like qualitative impairment in social interaction, impairment in communication, restricted repetitive and stereotyped patterns of behavior or interests (Kaplan and Sadock, 2007).

Hyperacusis is a rare hearing disorder that causes perception of unbearably loud sounds or noise to children with autism, sounds which would otherwise seem normal to most people. People who suffer from hyperacusis may even find normal environmental sounds to be too loud. Hyperacusis is not discomfort around loud sounds. Individuals with hyperacusis may find a car engine, dishes clanking, rustling of paper, or even loud conversation uncomfortable enough to avoid such situations. Many people with hyperacusis have normal hearing. The disorder can occur in one or both ears and is often accompanied by tinnitus. The hyperacusis network reports that, 1 in 50,000 people with autism have hyperacusis and that, 1 in 1,000 people diagnosed with autism who have tinnitus, will also have hyperacusis.

As autism rates grow, more families are living with someone who has hyperacusis. Reports estimate that, up to 40% of children with autism have hyperacusis. Often people with autism can have multiple sensory integration issues involving hearing and other senses (Goodson, 2011).Often parents observe that the children put their hands over their ears, run away from sounds, or sometimes lose control of their behaviors in the presence of certain sounds. These children are often identified as having auditory hypersensitivity or hypersensitive hearing.

Auditory Integration Training (AIT) is a treatment for children with autism, and those having hyperacusis. It was originally developed by Guy Berard in France in the 1960s and introduced into the United States in 1991. It is an intervention in which, the listener receives 18 to twenty listening sessions, lasting for thirty minutes, over a ten to twenty day period in most cases, with a one or two day break after five days of listening. During the listening sessions, the child listens to processed music. The AIT sound amplifier attenuates low and high frequencies at random from the compact discs, and then this is modified, and the music is given to the child using headphones. The intensity level during the AIT listening sessions should not exceed 80 decibel and is set at much lower intensities depending on the individual's comfort level (Al-ayadhi and Majeed, 2013).

Coelho, Sanchez and Tyler (2007) conducted a study to estimate the prevalence of hyperacusis among school aged children. Five hundred and six children with autism between 5 to 12 years of age from 15 different schools participated in the study. The questionnaire and interview was used to test lowered loudness discomfort levels associated with an abnormal annoyance to sounds. Results showed that, 42% of the participants in this group were bothered by sounds and 3.2% had hyperacusis. Fifty percent of the participants with

hyperacusis had tinnitus and mild hearing loss in the left ear as an associated factor. Phonophobia was experienced by 9% of children. It was concluded that, hyperacusis in children is prevalent, and should be considered in clinical examinations.

Statement of the Problem

Effect of Auditory Integration Training on Hyperacusis among Children with Autism at a Selected Special School, Coimbatore.

Objectives

- Assessment on the level of hyperacusis among children with autism.
- Assessment on the level of hyperacusis after implementation of auditory integration training among children with autism.
- Comparison on the level of hyperacusis before and after implementation of auditory integration training.

Hypothesis

H_1-There is a significant difference in level of hyperacusis among children with autism before and after administering auditory integration training.

Materials and Methods

Research Approach: Quantitative Approach

Research Design: One group pretest post test pre experimental design.

Research Setting: The study was conducted at Jeyam Special School, managed by a private organization located at Gandipuram in Coimbatore. The total strength of the school is 70. Children with mental retardation, autism, cerebral palsy, learning disabilities and attention deficit hyperactivity disorder attend this school. These children gain special education like rehabilitation training, vocational therapy and occupational therapy as a routine every day.

Population: The target population of the study was children with autism between the age group of 3 to 16 years. The accessible population was 43 children with autism attending Jeyam special school.

Sampling: Using convenient sampling technique, 27 children were included for the main study.

Criteria for Sample Selection

Inclusion criteria

- Autistic children between the age group of 3 to 16 years with hyperacusis.

Exclusion criteria

- Children with autism associated with seizure disorder and hyperactivity.
- Children with severe autism.

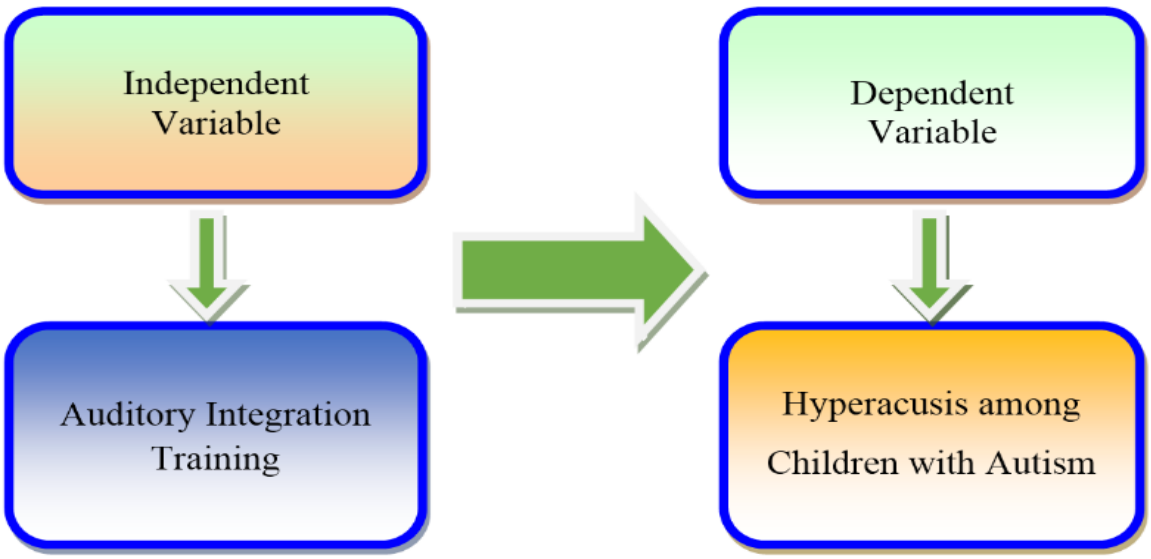

Fig 1: Schematic Representation of the Research Variables

Tool for Data Collection

The following materials were used for the study.

- Questionnaire on Demographic Profile
- Modified Sensory Profile Questionnaire

Questionnaire on Demographic Profile

Demographic data consists of personal information about the child such as, age of the child, gender and number of siblings. It also included caretaker's data like gender, education, relationship of caretaker with the child, consanguinity and detail on special training on caring for children with autism, data regarding disability of child including age at diagnosis, duration of special schooling and history of audiometric investigation.

Modified Sensory Profile Questionnaire

The modified sensory profile questionnaire was created in 1991 by Winnie Dunn. It is a questionnaire to evaluate the auditory sensory processing on daily activities and functional performance of children. It consisted of 18 items. It was administered to the caretakers of children with hyperacusis.

Scoring

Each item was scored on a five point Likert scale ranging from 0 to 4. The scores were calculated as '0' for never, '1' for seldom, '2' for occasionally, '3' for frequently and '4' for always. The total score was calculated by adding the scores of each answer. The maximum score was 72 and minimum score was 0.

Score Interpretation

The scores were interpreted as follows
1 to 24: Mild hyperacusis
25 to 48: Moderate hyperacusis
49 to 72: Severe hyperacusis

Techniques of Intervention

Auditory Integration Training

Auditory integration training was introduced in United States in 1990 by Guy Berrad. AIT is an intervention that is used for individuals who have difficulty with auditory perception, discrimination, processing, and hyper or hyposensitivity to sounds. The training involves, making the child listen to high frequency sounds alternating with low frequency sounds, to improve their tolerance to sounds. High frequency sounds included natural sounds such as chirping of birds, running water, wind, frogs, insects, whistle, infant's scream as well as child's voice. Low frequency sounds included deep man's voice, thunder sound, tiger roaring, sounds from electrical appliances and vehicles. Auditory integration training was administered by the researcher to each child for a period of ten days. It consisted of two sessions per day, separated by minimum of three hours interval. Each session of auditory integration training lasted for thirty minutes. The high and low frequency sounds were carefully selected by the investigator.

Procedure

- A safe and calm environment was provided for auditory integration training.
- The child was made to sit in a comfortable position.
- The child was allowed to listen to the sounds using electronic device which randomly switches high frequencies and low frequencies.
- Auditory integration training was administered by the researcher to each child for a period of ten days. It consisted of two sessions per day, separated by minimum of three hours interval. Each session of auditory integration training lasted for thirty minutes.
- During the first session, the child listened to modulated sounds at a very low volume. The volume was gradually raised over the course of twenty sessions.

Data Analysis and Interpretation

Descriptive and inferential statistics were employed to analyze the data. Frequency and percentage were used to present the demographic characteristics. The level of hyperacusis was analyzed through mean, standard deviation and mean difference. Paired 't' test was used to analyze the difference between pre and post test level of hyperacusis. Chi square was used to analyze the association between the level of hyperacusis and selected demographic variables before auditory integration training.

Demographic data revealed that, 13 (48.15%) children were within the age group of 3 to 6 years, 12 (44.44%) children belonged to the age group of 7 to 10 years and 2 (7.41%) children were between 11 to 14 years of age. Sex distribution showed that, 20 (74.07%) of the children were males and 7 (25.93%) were females. Data revealed that, majority (70.37%) of children had one sibling, 1 (3.70%) child had 2 siblings and 7 (25.93%) were single children. Majority (88.89%) of caretakers were females and 3 (11.11%) were males. Data on educational status of parents revealed that, 14 (51.85%) caretakers were graduates, 7 (25.93%) had higher secondary education and 6 (22.22%) caretakers had a secondary education.

Information on relationship of caretakers showed that, 24 (88.89%) of them were mothers and 3 (11.11%) were fathers of children with hyperacusis. Majority (81.48%) of the caretakers had not attended any training in caring for children with autism, and 5 (18.52%) caretakers had undergone training. Information on consanguinity reveled that, revealed that, majority (74.07%) of the caretakers had non consanguineous marriage, and 7 (25.93%) caretakers had a consanguineous marriage. Majority (77.78%) of children were diagnosed to have autism between 2-4 years of age and 6 (22.22%) children were diagnosed between 4-6 years of age.

Out of 27 children, 51.85% children were attending the special school between 3-5 years, and 13 (48.15%) children were attending the special school for less than 2 years.

Table 1: Level of Hyperacusis among Children with Autism before Auditory Integration Training

(n=27)

S. No	Level of Hyperacusis	No. of Participants	
		Frequency	Percentage (%)
1	Mild	5	18.51
2	Moderate	18	66.67
3	Severe	4	14.82

Table 2: Hyperacusis Scores of Children with Autism before Auditory Integration Training

(n=27)

S. No	Hyperacusis Scores	Pretest	
		Frequency	Percentage (%)
1	1 -12	-	-
2	13 -24	5	18.52
3	25 -36	12	44.44
4	37 -48	6	22.22
5	49 -60	4	14.82
6	61 -72	-	-

Table 3: Level of Hyperacusis among Children with Autism after Auditory Integration Training

(n=27)

S. No	Level of Hyperacusis	No. of participants	
		Frequency	Percentage (%)
1	Mild	13	48.15
2	Moderate	13	48.15
3	Severe	1	03.70

Table 4: Hyperacusis Scores of Children with Autism after Auditory Integration Training

(n=27)

S. No	Hyperacusis Scores	Post test	
		Frequency	Percentage (%)
1	1 -12	1	3.70
2	13 -24	12	44.44
3	25 -36	9	33.33
4	37 -48	4	14.82
5	49 -60	1	3.70
6	61 -72	-	-

Table 5: Comparison on Level of Hyperacusis before and after auditory integration training

(n = 27)

S. No	Level of hyperacusis	Pre test		Post test	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1	Mild	5	18.51	13	48.15
2	Moderate	18	66.67	13	48.15
3	Severe	4	14.82	1	3.70

Table 6: Hyperacusis Scores of Children with Autism Before and After Auditory Integration Training

(n=27)

S. No	Hyperacusis scores	Pretest		Post test	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1	1 -12	-	-	1	3.70
2	13 -24	5	18.52	12	44.44
3	25 -36	12	44.44	9	33.33
4	37 -48	6	22.22	4	14.82
5	49 -60	4	14.82	1	3.70
6	61 -72	-	-	-	-

Table 7: Effect of Auditory Integration Training on Hyperacusis among Children with Autism

(n=27)

Test	Mean	Standard Deviation	Mean difference	't' Value
Before intervention	34.52	9.44	8.89	13.66***
After intervention	25.63	9.04		

***Significant at 0.00l level

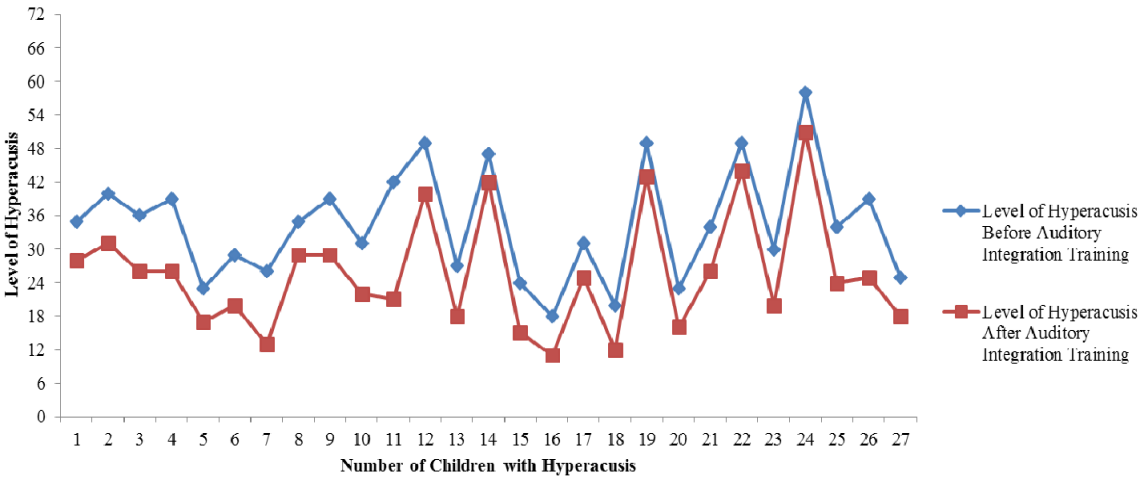

Fig 2: Level of Hyperacusis Before and After Auditory Integration Training among Children with Autism

Table 8: Association between Pretest Level of Hyperacusis and Selected Demographic Variables among Children with Autism

S. No.	Demographic Variables	Category	Frequency	Level of Hyperacusis			χ^2 value	Df (r-1)(c-1)	χ^2 Table value
				Mild	Moderate	Severe			
1	Age	3 – 6 years	13	0	11	2	10.36*	4	9.49
		7 – 10 years	12	4	6	2			
		11 – 14 years	2	0	2	0			
2	Gender	Male	20	4	13	3	0.91	2	5.99
		Female	7	1	5	1			
3	Special training of caretakers	Yes	5	2	1	2	5.33	2	5.99
		No	22	3	17	2			
4	Marital history of caretakers	Consanguineous	7	3	3	1	2.86	2	5.99
		Non consanguineous	20	3	15	2			
5	Age at diagnosis	2 – 4 years	21	5	14	2	3.72	2	5.99
		4 – 6 years	6	0	4	2			
6	Duration of special schooling	0 – 2 years	13	1	11	1	4.21	2	5.99

*Significant at 0.05 level

Limitations

The study was confined to small number of subjects and shorter period.

Recommendations

1. A similar study can be conducted on a larger sample.
2. Similar study can be conducted with a control group.
3. Auditory integration training can be used as a routine non pharmacological intervention among children with autism who have hyperacusis in clinical settings.

Conclusion

Auditory integration training is a non pharmacological therapy used in the present study to evaluate the level of hyperacusis among children with autism. The findings revealed that, auditory integration training reduces hyperacusis among children with autism. The therapy is also cost effective. Hence the researcher concluded that, all pediatric nurses should adopt this intervention in their clinical practice to reduce hyperacusis among children with autism.

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