Chapter-II

REVIEW OF LITERATURE

Music therapy today has become an accepted as a para-medical discipline. Numerous studies are being conducted today with music therapy to gauge the therapeutic effect of music upon various medical conditions be it physical (Noda, 2004) or mental (Berger and Gabriele, 2004). It is also used to foster cognitive (Schellenberg, 2004) and usher better communicative skills (Martin and Lori, 2004). It is also known to facilitate emotional expression and management (Kallilen and Ravaja, 2004).

Music therapy is especially helpful for persons with autism (Rachael Evans, 2006) They have an inevitable soft corner for music and quite a few of them reach singing abilities before developing communicative speech.

Autism management today is a universal concern. Scientists, medical and paramedical professional all are trying to mainstream persons with autism, enabling them to lead near normal lives.

The latest management technique is Relationship Development Intervention abbreviated as RDI (Gutstein, 2009). One scientist from this school of thought, Peter Hobson inferred that in autism some factors interfere with the specific early parent-child learning experiences required for developing dynamic neural networks, while generally leaving the static brain pathways intact. As a
result of which the brain does not develop the capacity for dynamic growth.

RDI attempts to give a second chance for families with an ASD child to successfully engage in the universal developmental relationship that, through no fault of their own, had not been successful on the first go around. They devised a system called the GPR i.e. the Guided Participation Relationship. They accepted that the problem did not lie with any parental deficiency or characteristic. The same parents, who appeared unable to guide their ASD children, typically formed excellent guiding relationships with the child’s typically developing siblings.

Hobson (2009) took this concept a step further by hypothesizing that there is no specific vulnerability, no part of the brain, no specific chemical imbalance or gene, that in and of itself is responsible for ASD. He hypothesized that ASD can be triggered by a variety of possible pre-natal and genetic abnormalities. This has now become a scientifically accepted belief about the origin of the condition. Hobson implied that if the combination and impact of the child’s impairments were sufficiently great, they would interfere with his or her ability to contribute the necessary ingredients to make the parent-child relationship work and thus prevent the emergence of dynamic pathways for neurological and mental growth.

RDI specialists say 1/3rd of people with ASD have problems with static intelligence (below average IQ). Everyone with ASD fails to develop dynamic intelligence.
Static abilities include:

- Memorizing facts
- Reading for surface meaning
- Executing conditional associations
- Applying procedures
- Following flow charts
- Math computation
- Accurate description
- Following rules

Dynamic Intelligence includes:

- Adaptation
- Continuous monitoring and regulating
- Relative thinking
- Good-enough thinking

For dynamic intelligence to develop someone (guide) has to take responsibility to provide productive mental challenges and provide just enough help so that the child (apprentice) does not become discouraged.
Such a system enables the child to start communication, which is one of the major challenges of autism. Gutstein et al. (2007) conducted a study with 16 children with autism, the age range was 21-111 months and the IQ ranged from 70-124. They exposed the children to RDI for 2 years. They found significant improvement in the post RDI evaluation in communication and socialization as quantified in Autism Diagnostic Observation Schedules (ADOS).

Various other methods have been implemented to reduce autistic symptoms:

The efficacy, of different behaviour modification techniques, along with the educational methods for the autistic children, was proved in a study by Kielinen et al. (2002). In their work among 187 autistic children of the age range 3-18 years only 152 children and adolescents received more than one therapeutic interventions or specific training program. The interventions included- physiotherapy, speech therapy, occupational and music therapy, Teacch, Lovaas and Portage program. Almost all the samples showed some improvement on the Childhood Autism Rating Scale scores though the improvement was not statistically significant. This study was criticized for its inclusion of therapies. The idiosyncratic application of the specific therapy as well as its effect was not revealed.

Autism is also considered as a communication disorder, so from this perspective different educational methods have been introduced to improve the communicative skills of these children. Buffington et al. performed one such study in 1998. In their
research titled “Procedures for teaching appropriate gestural communication skills to children with autism”, they taught four children with autism to use gestures in combination to oral communication. At the end of the study all the participants acquired this skill with the systematic implementation of modelling, prompting and reinforcement. As a result their behaviour became more socially appropriate.

In a research work conducted in Indian context by Banerjee (2006) it was revealed that communication of autistic children showed improvement after speech therapy and maximum improvement was evident in cases where parents were empowered.

According to the study of Charlop-Christy et al. (2002), the picture exchange communication system (PECS) is an augmentative communication system frequently used with children with autism. The study was done with three autistic children and the findings revealed that all of them met a learning criterion for PECS and showed concomitant increases in verbal speech. Ancillary gains were associated with increases in social-communicative behaviours and decreases in problem behaviour. However, more sample and sample specifications are needed to reach a conclusive concept.

so that they become functional and interactive. He categorized autistic children as having *system forming disorder*-children who are scattered and have problem in systematizing; and *closed system disorder*-who are preoccupied with routines. When the child is engaged with the usual way of doing things it is important after a time to vary those routine. Once the child can cope with the expansions and interruptions in their stereotyped routine they can cope with more dramatic disorder. The uniqueness of Miller Method lies in the fact that it attempts to transform the repetitive behaviours of children with autism into functional and interactive exchanges and attempts to systematically expand, complicate and interrupt these activities to elicit spontaneous initiatives from the children. The concept has started its popularity in Western countries, but improvisation is needed in Indian culture.

The study of *Theimann & Goldstein* (2001), recommended for visually cued instructions to guide social language development of young children with autism.

In another study, *Bolte et al.* (2002), has recommended the use of computer programme for recognition of the affect, though improvement found was limited to the area of social-communicative function.

This was supported by the findings of *Williams et al.* (2002) in their work entitled, "Do children with autism learn to read more readily by computer assisted instruction or traditional book method?" It was found that children with autism spent more time
on reading material when they accessed it through a computer and were less resistant to it.

Educational management for autistic children also consists of the video modelling procedure. In a study by Charlop-Christy & Freeman (2000), it was revealed that video modelling has motivating and attention maintaining qualities which are beneficial for the autistic children. All these studies are highly criticized for their too short sample size, subjectivity and overgeneralization.

Sensory disintegration is a major problem in children with autism. This in turn gives birth to varied numbers of behavioural problems including idiosyncratic responses to sensory stimuli and unusual motor patterns.

Under behaviour modification program and functional analysis plays an important role in managing problem behaviour. The following studies confirm this:

Functional analysis is considered as a subtype of behaviour modification program. Tarbox et al. (2004) admitted that some problem behaviour might occur at too low rate that is often difficult to observe during a standard functional analysis, despite the fact they are highly destructive in nature. In this research, the author mentions about initiating functional analysis session and proved its effectiveness in reducing problem behaviour.

La Belle et al. (2002) uses functional analysis little differently, as an assessment tool. Result showed that problem behaviour were
maintained by multiple functions, for e.g. attention, escape, tangible and automatic reinforcement. But new methodology for assessing changing functions of aberrant behaviour revealed that contingencies initially applied to target behaviour were associated with changing functions of that behaviour during the course of an experimental session.

Campbell (2003) also studied on the efficacy of behavioural intervention for stabilizing problem behaviour in the persons with autism. The result also confirmed the effectiveness of behavioural treatments in reducing problem behaviour in the individual with autism. But this also mentions that type of target behaviour and type of treatment did not moderate the average effect of treatment as measured by percentage of zero data (PZD). Reliability of observation and number of treatment data were positively related to PZD scores. The findings also pointed out that the treatment that is based on experimental functional analysis produced higher average PZD scores than in the treatment where the researcher did not include experimental functional analysis.

Researcher has proved that behaviour treatment is effective mode to reduce problem behaviour. Eikeseth et al. (2002) proved through his study that behaviour treatment is more effective as compare to eclective treatment. He starts evaluation of 4-7 years old autistic children after 1 year of intensive program and the result also support its effectiveness.

Horner et al. (2002) in his paper provides a summary of research regarding behaviour intervention for the children with autism. His
analysis is divided into 4 sections: (1) emerging themes in the technology of behaviour support, (2) a review of existing research syntheses focusing on behavioural intervention, (3) a new literature review of current pertinent research and (4) an evaluation discussion of the synthesis result. His research emphasized on the development of effective behavioural intervention for the children with autism and advised about an advance behavioural technology to meet the needs of autistic children.

Like Horner et al., Borrero & Vollmer (2006) also suggested that separate intervention is useful to reduce problem behaviour. His study was designed to reduce problem behaviour of a young boy with developmental disability. Each intervention was designed to address a specific function of problem behaviour and at the end of the research, positive outcome have been found out.

Neither psychologist nor special educator alone can provide effective problem behaviour intervention to the persons with disability. It is a team effort to challenge the challenging behaviour. Van et al. (2002) study also revealed the same. In their article a pool of professional who have experienced in handling individuals who exhibit challenging behaviour participated in the program to reduce problem behaviour of a 24 years old man who spent most of the time in one room. This process requires 7 years and finally the person fulfilled his desire by visiting UK by Hovercraft.
In another research, Fritz et al. (2004) who tried to find out the cause of problem behaviour. They suggested that the people with developmental disability engaged in destructive behaviour when demands were presented and this behaviour can be strengthened by negative reinforcement. Subsequent analysis also revealed that (1) behaviour problems persisted when the participants were asked to cease a high-probability, ongoing activity (walking) while demand were not presented and (2) problem behaviour ceased when the participants were trained to request access to walking through appropriate means. They concluded from the findings that presentation of demands was critical variables in maintaining destructive behaviour, rather it appear to restrict the participants from walking, which was coincidentally necessary in the initiation of demands, set the occasion for the aberrant response.

Almost similar kind of study done by McAtee et al. (2004) who intended to develop a systematic assessment of a broad range of contextual variable that affect problem behaviour. In his article the author developed a user-friendly inventory to aid the initial assessment of contextual variables and secondarily in identification of factors relevant in enhancing reliability of contextual assessment. At the end it is found that newly structured inventory is efficient, comprehensive and comprehensible.

It is true any kind of intervention can effectively reduce problem behaviour. But Saloviita (2002) revealed that not only intervention but also post training is important to maintain the
corrected behaviour. His intervention helped to cure bed-wetting problem of a 17 years and 20 years old women with autism. But he specifically mentioned that post training helps them to remain almost dry for next 9 years and he also found that by any way when the post training was discontinued they returned back to original nightly occurrence.

Researcher Mullins & Christian (2001) felt that relaxation is another intervening method that was used for reducing disruptive behaviour of a boy with autism and the result also showed the positive effect on reducing problem behaviour after relaxation training.

By manipulating physiological environment problem behaviour can also be controlled. DeLeon et al. (2004) also emphasized on physiological aspect for controlling problem behaviour. His work brought change in the behaviour when he manipulated the experimental condition i.e. sleep pattern. He observed that self-injurious behaviour occurred primarily within one hour after waking rather than occurred in the whole day and his faded bedtime procedure was effective to reduce awakening by 81% and post waking self-injurious behaviour by 82%.

Similarly, Gordon (2000) also worked on physiological aspect for improving behaviour. He uses neural system perspective to explain some behavioural impairment in autism. He also suggested about different ways and methods of improving problem behaviour.
All the above research works are, no doubt, have tried to establish their views up to a certain level, but almost none of them is fully successful in reducing or describing the root of problem behaviours. Moreover, most of the above studies have dealt with the younger age group like 4-7 yrs Elkeseth et al. (2002), or only children population by Horner et al. (2002). Some studies have used very small sample - as small as two adolescents (Salovita, 2002) and even one boy (Mullins & Christian) or one adult (Van et al., 2002) to derive any conclusion. Again, most of the studies have emphasized on one or two problem/s on emergent basis. For example, Van et al. (2002) was able to break the isolation of a 24 yrs adult person with autism by implementing a massive 7 yrs behaviour-modelling program. Salovita (2002) worked only on the problem of bed wetting with two adolescents and adults male and female autistic persons. Friz et al. (2004) worked only on the problem, viz., 'Constant walking without purpose'.

Besides behaviour modelling, some researcher have used relaxation technique (Mullins & Christian, 2001) to reduce disruptive behaviour and still some others used physical measures, like, manipulating sleep Patten in controlling problem behaviour (Deleon et al., 2004).

Occupational therapy and sensory integration play a major role in management of problem behaviour:

Baranek (2002) in his study "Efficacy of sensory and motor interventions for children with autism" attempted to establish the
efficacy of sensory and motor-based interventions to address the behavioural problems of children with autism.

In another study by Walting et al. (1999), titled "Current practice for occupational therapy for children with autism", it was found that intervention service typically provided in a one-to-one format with the most common techniques being sensory integration and positive reinforcement. This study clarified the nature of current practice patterns of occupational therapy for children with autism.

Case-Smith & Bryan (1999) performed a research on "The effects of occupational therapy with sensory-integration emphasis on preschool age children with autism". Using single-subject research design, the effect of an occupation therapy intervention emphasizing sensory integration with five preschool children with autism was examined. The results supported descriptions in literature regarding the behavioural changes that children with autism can make when participating in intervention using sensory integration approach.

Auditory Integration Therapy

In her book 'Dancing in the Rain' Stehli (1995) has presented a collection of case histories written by parents about the progress of their children with ADD, CAPD and PDD. The progress is essentially ushered by Auditory Integration Therapy (AIT).

AIT is a new intervention developed in France, addresses the hearing distortions, hyperacute hearing, and sensory processing
anomalies which cause discomfort and confusion in learning disabled and developmentally delayed children. Berard seeks to retrain the auditory system by correcting hearing distortions. During the twenty half-hour training sessions, participants listen with headphones to a musical program modified and filtered through an electronic device called an 'AudioKinetron'.

Post AIT children have reported the following:

- The rain doesn’t sound like a machine gun anymore.
- The motorcycles are gone from my head, and I can still hear people blink but I can tune it out.
- I started feeling different inside after AIT, and now I don’t need to be angry anymore. It’s not so much work to understand people, and noises don’t scare me anymore.

Apart from the hardcore scientific techniques, art has also made its offerings to the autistic population.

Brownwell (2002) investigated the effect of a musical presentation of social story information on the behaviours of students with autism. A unique social story was created for each student that addressed the current behaviour goal and original music was composed. The results suggested the use of musically adapted versions of social stories is an effective and viable treatment option for modifying behaviours with this population.

In the study by Barber (1999), titled "The effect of music and color therapy as a behaviour modifier”, a totally different aspect
was dealt with. This study emphasized the peaceful and relaxing effect of music and colour therapy which would soothe the chaotic environment of a child with autism.

In a case study by Sengupta & Banerjee (2006) a significant effect of dance therapy was observed on socialization and communication of a 13 year old autistic child.

Landqvist et al. (2008) conducted a research with vibroacoustic music on on self-injurious, stereotypical, and aggressive destructive behaviours in 20 individuals with autism spectrum disorders. The first group received 10-20 min sessions with vibroacoustic music treatment for 5 weeks. Then the second group received the same treatment during the next 5 weeks. The results revealed that vibroacoustic music reduced self-injurious, stereotypic, and aggressive destructive behaviours in the participants. However, generalizations are difficult to make with such a small sample size.

The Otakar Musical Trust under the leadership of Margaret Lobo, have started music therapy with children in ASD. There each child selects a percussion instrument that they would like to play. The children are then given an opportunity to explore their chosen instrument.

The creative environment the workshop provides very quickly awakens the children’s interest, and they are always surprised by the possibilities music opens up for them. Many children discover resources of creativity they were previously unaware they
possessed. After the children have built up their confidence by playing the instruments, they are given an opportunity to explore their imagination further by using torches, lights and silhouettes. Dr. Lobo insists that the child should be allowed to use music as par his choice and the adult should make it meaningful.

This somehow becomes difficult with severely autistic children since they are relatively more oblivious about their surroundings.

Dr. Staum of Autism research Institute also advocates the active involvement of the children in the therapy sessions. She says music Therapy is particularly useful with autistic children owing in part to the nonverbal, non threatening nature of the medium. Parallel music activities are designed to support the objectives of the child as observed by the therapist or as indicated by a parent, teacher or other professional. A music therapist might observe, for instance, the child's need to socially interact with others. Musical games like passing a ball back and forth to music or playing sticks and cymbals with another person might be used to foster this interaction. Eye contact might be encouraged with imitative clapping games near the eyes or with activities which focus attention on an instrument played near the face. Preferred music may be used contingently for a wide variety of cooperative social behaviours like sitting in a chair or staying with a group of other children in a circle.

Music Therapy is particularly effective in the development and remediation of speech. The severe deficit in communication observed among autistic children includes expressive speech which
may be nonexistent or impersonal. Speech can range from complete mutism to grunts, cries, explosive shrieks, guttural sounds, and humming. There may be musically intoned vocalizations with some consonant-vowel combinations, a sophisticated babbling interspersed with vaguely recognizable word-like sounds, or a seemingly foreign sounding jargon. Higher level autistic speech may involve echolalia, delayed echolalia or pronominal reversal, while some children may progress to appropriate phrases, sentences, and longer sentences with non expressive or monotonic speech. Since autistic children are often mainstreamed into music classes in the public schools, a music teacher may experience the rewards of having an autistic child involved in music activities while assisting with language.

But as mentioned before, involving a severely autistic child actively in music can be difficult.

Walworth (2009) presented a paper to identify and compare goals and objectives addressed by music therapists, for use with children at risk or diagnosed with a communication impairment including Autism Spectrum Disorder (ASD). A video analysis of music therapists working with clients at risk or diagnosed with ASD (N=33) was conducted. Results of the analysis indicated that many goals and objectives can be addressed in music therapy interventions. She declared music therapy allows children with autism to communicate in a unique way. The author surveyed music therapists and asked
1. What are the written goals of music therapy for children with autism?

2. What is done in music therapy to address these goals?

3. How long is music therapy?

4. What tools are used?

She found music therapy can help children with autism, but it is best when used with treatment goals.

Peretz (2002) did a review of literature on brain specialization of music and found music like language is a universal and specific trait to humans. Similarly, music appreciation, like language comprehension, appears to be the product of a dedicated brain organization. Support for the existence of music-specific neural networks is found in various pathological conditions that isolate musical abilities from the rest of the cognitive system. She concluded autism and epilepsy can reveal the autonomous functioning and the selectivity, respectively, of the neural networks that subserve music. However, brain specialization for music should not be equated with the presence of a singular 'musical center' in the brain. Rather, multiple interconnected neural networks are engaged, of which some may capture the essence of brain specialization for music. The encoding of pitch along musical scales is likely such an essential component. The implications of the existence of such special-purpose cortical processes are that the human brain might be hardwired for music.
Heaton (1999) conducted a study with 14 children with autism and Asperger syndrome and their age and intelligence matched controls were tested for their ability to identify the affective connotations of melodies in the major or minor musical mode. They were required to match musical fragments with schematic representations of happy and sad faces. Results lead to the conclusion that children with autistic disorders do not show deficits in processing affect in musical stimuli. They further found individuals with autism show equal or increased abilities in pitch-processing including memory, labelling and categorization in addition to high preference for music when compared to typically developing peers. Preliminary findings from clinical studies show potential for interactive individual music strategies to enhance areas such as communication and socialization.

Wigram et al. (2001) undertook a randomized controlled study repeated measures comparison design, both between conditions and within subjects. Children were randomly assigned to two groups; Group 1 had music therapy first, and then play sessions later. Group 2 had played first, then music therapy. The responsiveness in children was assessed with the Pervasive Developmental Disorder Behaviour Inventory (PDDBI), and the Early Social Communication Scales (ESCS).

Overall results from the PDDBI and the ESCS indicated that music therapy was more effective at improving pro-social behaviours in children with autism. Younger, less autistic and more verbal children gained more from these trials in both conditions than
'low functioning non-verbal, severely autistic and older children'. Session analysis revealed significant differences between conditions in target behaviours.

In the western world the sonatas and symphonies of Mozart has time and again been used to heal persons with autism and epilepsy.

The concept of the "Mozart effect" was described by French researcher, Dr. Alfred A. Tomatis (1991) in his book Pourquoi Mozart. He used the music of Mozart in his efforts to "retrain" the ear, and believed that listening to the music presented at differing frequencies helped the ear, and promoted healing and the development of the brain.

Rauscher, Shaw & Ky (1993) investigated the effect of listening to music by Mozart on spatial reasoning, and the results were published in Nature. They gave research participants one of three standard tests of abstract spatial reasoning after they had experienced each of three listening conditions: a sonata by Mozart, repetitive relaxation music, and silence. The authors found that the mean standard age scores converted into IQ scores were 8 to 9 points higher after the participants had listened to the music than after either of the other two conditions.

The 1997 book by Don Campbell, "The Mozart Effect: Tapping the Power of Music to Heal the Body, Strengthen the Mind, and Unlock the Creative Spirit", discusses the theory that listening to Mozart (especially the piano concertos) may temporarily increase one's IQ.
and produce many other beneficial effects on mental function. Campbell recommends playing specially selected classical music to infants, in the expectation that it will benefit their mental development. These theories are controversial. The relationship of sound and music (both played and listened to) to cognitive function and various physiological metrics has been explored in studies with no definitive results. After *The Mozart Effect*, Campbell wrote a follow-up book, *The Mozart Effect For Children*, and created related products. Among these are collections of music that he states harness the Mozart effect to enhance "deep rest and rejuvenation", "intelligence and learning", and "creativity and imagination". Campbell defines the term as "an inclusive term signifying the transformational powers of music in health, education, and well-being. It represents the general use of music to reduce stress, depression, or anxiety; induce relaxation or sleep; activate the body; and improve memory or awareness. Innovative and experimental uses of music and sound can improve listening disorders, dyslexia, attention deficit disorder, autism, and other mental and physical disorders and diseases".

Mozart's Sonata for Two Pianos in D major K.448 has also been known to reduce the number of seizures that people with epilepsy have. The University of Illinois Medical Center did an experiment on 29 epileptic patients. After listening to the piece for up to 300 seconds, 23 of the 29 patients experienced significant decreases in epileptiform activity, even from patients in comas. They are not certain if this effect is immediate or if it requires 40-300 seconds to become apparent.
The present study has used receptive method of music therapy.

This method has been recognized by Grocke & Wigram (2009). According to them, specific use of receptive (listening) methods and techniques in music therapy clinical practice and research, induce relaxation with music for children and adults. The authors explain these receptive methods of intervention use a format that enables practitioners to apply them in practice and make informed choices about music suitable for each of the different techniques.

Hagemann & Verlag (2004) help bolster passive music therapy in a climate where active therapy had long dominated. In order to build bridges with their English-speaking colleagues, the therapist authors have translated 16 of the original 21 articles, and added two new ones. Among the topics are receptive music therapy from a psychoanalytical viewpoint, the guide-traveller relationship as a developmental relationship for the self, anthroposophic music therapy, and stories written under musical induction.

Marconato et al. (2001) conducted a study to investigate the effects of receptive music therapy in clinical practice.

Receptive music therapy was individually applied via musical auditions, including five stages: musical stimulation, sensation, situation, reflection, and behavioural alteration. Following anamnesis and obtainment of consent, patients answered a first questionnaire on health risk evaluation (Q1), and after participating in 16 weekly music therapy sessions, answered a second one (Q2). Two men and 8 women, aged above 18 years,
referred due to symptoms of stress, emotional suffering, and the need to change lifestyles (health risk behaviour) were studied between August 1998 and December 1999.

Comparison between answers to Q1 and Q2, showed a trend (P=0.059) for reduction of ingestion of cholesterol rich foods and for increased prospects in life with a tendency towards improvement, and also of increased intake of fibre rich food (55.6%), increased levels of personal satisfaction (44.5%), and decreased levels of stress (66.7%).

The study demonstrated decreased stress levels and increased personal satisfaction, higher consumption of fibre-rich food, lower cholesterol intake, and a better perspective on life, suggesting that receptive music therapy may be applied in clinical practice as an auxiliary therapeutic intervention for the treatment of behavioural health risks.


All randomised controlled trials or controlled clinical trials comparing music therapy or music therapy added to standard care to placebo therapy, no treatment or standard care were taken.

They examined the short-term effect of brief music therapy interventions (daily sessions over one week) for autistic children.

Music therapy was superior to "placebo" therapy with respect to verbal and gestural communicative skills, but it was uncertain
whether there was an effect on behavioural outcomes. The included studies were encouraging, but of limited applicability to clinical practice.

More research with better design, using larger samples, in more typical clinical settings is needed to strengthen the clinical applicability of the results and to examine how enduring the effects of music therapy are.

So it can be seen the use of music therapy in the western world is quite extensive. Now we need to look at India. We have a rich cultural heritage and its time we contribute with the same in the healing sciences.

Duttaroy (2007) of Indian Statistical Institute has started research on the effect of sound the clinical population. He has brought the concept of vibro acoustic therapy in India. He has worked in collaboration with Professor Olav Skille, the pioneer in development of Vibro Acoustic Therapy. They advocate-life is vibration - Matter is vibration. A newborn baby contains about 90% water. An old person contains only 70%. All this water is set in motion when our bodies are exposed to sound vibrations. Music Therapy is now generally considered to be a psychotherapeutic method. But in order to obtain a strong and more specific effect it is necessary to have a source which has pure enough definition of the vibrating frequencies. Music contains too many frequencies and is therefore not pure enough in this context. If a single frequency is defined, it is possible to register the physiological effects of each frequency and accordingly it is possible to obtain
stronger biological effects. This work on the physical effects of music vibrations was perfected by Skille from 1968 onwards and evolved to become the method now called Vibro Acoustic Therapy. The therapy requires regularly improved and developed equipments and promises maximum fruitful results.

Banerjee (2006) in her study "Efficacy of music therapy as an intervention procedure for autism" examined the effect of both verbal and tune music on 'autism'. A group of 40 autistic children participated in the study music therapeutic sessions were given equally to all children. The findings indicated the positive and highly significant effects of music (verbal and tune) in each of the four dependent variables, viz., cognition, socialization, communication and hyperactivity.

Shankar R. (2004) has been using various ragas to heal children with autism. She started using music in therapy as a small experiment in September 2004 with 12-15 autistic children at the Sandipani wing of Little Hearts Hospital at Hyderabad. She teamed up with a colleague and a medical and paramedical group to see the effects of Indian classical music on these children. To start with, the children simply ran around in excitement but gradually they began to calm down and pay attention.

In order to select a particular raga she first studies the case history of the autistic child, and then spend a couple of hours with the child. After that, she tries out different ragas, see the response, and then zero in on the right one. Even small details like the child's behaviour at a particular time of the day, his favourite
food and colour is taken into consideration. There are some basic ragas to cleanse, like Malahari, others have other benefits.

Mst. P, a non-verbal autistic child, was nine when he came into therapy. Two years into therapy, he sang continuously for 45 minutes and communicated with everyone around.

But these observations do not have scientific credentials for poor methodology. Authentic documentation of pre-intervention assessment is not available.

Rakshit S (2007), music therapist practising at a hospital studies the history of each patient which includes his living style, the food habits, the medical records and even the astrological signs. The ragas of Indian classical music are classified according to 'prahar' (the time period of a day), and the therapy mandates hearing the raga in the ordained prahar only. For example hyperactive people are prescribed morning ragas. The morning ragas are those that should be listened to in the morning. These include Rāga Jogiya, Bhairavi, Todi, Bilash todi and Lalit etc. The afternoon ragas consist of Soodh Sarang, Jaunpuri, Bhim palasi with Rāga Yaman, Bihag, Kalyan and Sudh kalyan constituting the evening ragas. The night ragas would include Darbari Kanada and Adana.

In severe cases Rakshit starts the therapy with only instrumental music which is later upgraded to vocal music.

She recommends that the patient should listen to the music during the advised time period with a headphone. Usually each session is an hour long. The room should be dark and if that is not possible
then eyes should be covered with a dark coloured eye band. The patient should be comfortable so that musical vibrations seep into the body.

Music therapy helps cure autistic children claims Bansal (2008). Rāga Jogiya, Bhairavi, Malhar, Darbari are no longer just music to the ears, but also a form of treatment, recovery, prevention and improvement says gynaecologist and IVF specialist, Bansal. She feels that music is the essence of life and has an immense becalming effect on the mind. Music therapy helps cure infertility and autistic children. Both these are directly related to mental stress. Music therapy is showing positive results in post delivery and post operative recovery of patients. "We plan to use music therapy in our IVF techniques also", informs Dr Bansal.

The Swabhiman Trust in Kerala has also started music therapy on children with autism.

Partheeban (2010), Director of the Swabhimaan Trust in Chennai, works closely with autistic children every day. He explains that people with special needs have "disturbed body-mind-soul relationships" which can be "strengthened by bringing rhythm into their lives."

"Rhythmic music which is in conjunction with the heartbeat can be really soothing and rejuvenating," he adds. Good rhythmic music, whether it's drums, guitar, flute or veena, can stimulate the mind, depending on how the music is presented to the children. At Swabhimaan, he says, "music is an inseparable part of
everyday life. Children actively participate and contribute to the music sessions and we also conduct structured music classes for them.” Two of his students, 12-year-old Mukunth and 20-year-old Gokul “excel in music,” he adds.

When two-and-a-half-year-old Sanju, who is severely autistic, was first introduced to New Delhi-based music therapist Stuti Chandhok working in Swabhiman Trust he could barely make eye-contact or respond in any way. “He lived in a bubble,” recalls Stuti, who teamed up with an occupational therapist to devise a set of musical experiments for Sanju, adding, “We noticed that he liked to jump, it comforted him. So we got a trampoline and also played music in the background.” Three-year-old Ishita, from Visakhapatnam, is mentally challenged but responded favourably to music right from the first therapy session. While Sanju started making eye-contact with the therapists more often, his mother too was overwhelmed when the otherwise silent child started humming and making noises, raising hopes that he might later utter a few words too. Ishita’s mother too found her confident and communicating with others.

Mythily T (2010), Cognitive Neuro Psychologist a classical vocalist and music therapist Director of the Music Therapy Department in Apollo Hospitals, conducts unique courses in Medical Music Therapy in the Advanced level, Under Graduate and Post Graduate level.

Mukherjee, B. (2008) conducted a study designed as a set of individual case studies of ten children affected by ASD aged
between 3 and 7 years, selected on the basis of a common diagnosis of autistic spectrum disorder. A category system was developed to identify different communicative expressions and their progress from session to session. Second, a narrative analysis was conducted by identifying the occurrence of 'episodes of interaction' to produce the detail description of child's communicative expressions through voice and movements in each session. Music encouraged and motivated children's participation in musical interaction with the researcher leading to progress in communication and interaction skills and further communicative engagement between them. All the children in the study showed a common pattern of progress, beginning with a resistance or withdrawal followed by interest and exploration with the musical sounds, and then active participation leading to cooperative engagement with the researcher in music. A dip in performance after achieving a level of interaction was observed in common. The analysis of episodes helped to reveal different factors that influenced children's communication in musical interaction. The analysis of vocal and gestural communicative expressions proved that the child was engaging in intentional communication in the context of musical interaction with the researcher. In conclusion it is estimated that this form of engagement with autistic children has clear benefit.

However, in this study no structured musical intervention was provided. The therapist modified it as per the preference of each child. So, the question of evaluating the musical interventions in a
same platform does not arise. Moreover, the sample size is too less to reach a conclusion.

Sairam (2009), President Nada Centre for Music Therapy, is working with Indian Ragas on the clinical population especially with mentally retarded children. Sairam has passionately explored the healing ragas of music. Commenting on the change of outlook of people on music therapy, he says, “Ten years back when I started to propagate music therapy in public lectures, I encountered greater skepticism in the people, as compared to today. In fact, the modern researches have affirmed in the healing powers of music.”

Rani Pal Salani (2008) has also reinvented the concept of rāga chikitsha. Rāga chikitsa was an ancient manuscript, which dealt with the therapeutic effects of raga. The library at Thanjavur is reported to contain such a treasure on ragas that spells out the application and use of various ragas in fighting common ailments. According to an ancient Indian text, Swara Sastra, the seventy-two melakarta rāgas (parent ragas) control the 72 important nerves in the body. It is believed that if one sings with due devotion, adhering to the raga lakshana (norms) and sruti shuddhi (pitch purity), the rāga could affect the particular nerve in the body in a favourable manner.

While the descending notes in a rāga (avarohana) do create inward-oriented feelings, the ascending notes (arohana) represent an upward mobility. Thus music played for the soldiers or for the dancers have to be more lively and up lifting with frequent use of
arohana content. In the same way, melancholic songs should go for 'depressing' avarohanas.

Certain ragas do have a tendency to move the listeners, both emotionally as well as physically. An involuntary nod of the head, limbs or body could synchronize with lilting tunes when played.

**Some Therapeutic Ragas**

Some ragas like, *Darbari Kanhada, Kamaj* and *Pooriya* are found to help in defusing mental tension, particularly in the case of hysterics. For those who suffer from hypertension, ragas such as Ahirbhairav, Pooriya and Todi are prescribed. To control anger and bring down the violence within, Carnatic ragas like Punnagavarali, Sahana etc. do come handy.

Sumathy Sundar has introduced the concept of *nadopasana* (Dedication to music). She feels music can alter states of consciousness to enhance healing.

She elucidates the distinguished characteristics, the spiritual undercurrent and the philosophical framework of Indian Classical music integrating divinity and yoga which could be used as a help to gradually lead to 'Brahmananda' (blissful state: a realization of oneness with the Divine spirit and a path to seek salvation, in a clinical setting. Appropriate raga pieces rendered *with the rāga bhava (soul of melodic expression specific to a rāga)* and *sāhitya bhava (emotional expression of the lyric)* with contextual relevance are demonstrated which brings total relaxation and altered states of consciousness.
The glimpse on Music therapy in India with Indian ragas seems to be in a nascent stage. In spite of having such a rich cultural heritage in music we have not utilized the same in a clinical set up. Autism is also an unfolded mystery. So, the effect of Indian Ragas on autism has not been extensively explored. The present study can be humbly regarded as a pioneering scientific work on the same.
SCHEMATIC REPRESENTATION OF THE METHOD

Population—Autistic Children

Sample N=90

Criteria of Selection
Age – 4 years - 16 years. Matched pair
Sex – Male + Female technique
Level of Autism – mild to severe
SES – Middle class (both upper + Middle)

Expt. Grp. N=45

Cont. Grp. N=45

D.V. Socialization Communication Problem Behaviour.

Measured Portage Early

Measured PBCL

All the subjects were measured individually for D.Vs. before starting the intervention

Music (Eastern and western)

Exp. Grp were divided on

(4 weeks approx.)

Eastern Music Western Music Eastern Music Western

8 sessions each of 10 min duration

After 5 weeks all the measures of DV were administered for all