

ABSTRACT

Background and need for the study: Yoga programmes implemented with special children have demonstrated that yoga intervention lasting for few weeks to months resulted in increased working efficiency and ability to concentrate in children with special needs. Improvement in concentration/focus, organization, relaxation, tolerance for sitting, posture, ability to balance, understanding directions, better gross motor activities, imitate poses without assistance, increased eye contact and intelligence was found after implementation of a yoga program for some children with developmental disabilities. Researcher's previous ten years experience of working with Autism Spectrum Disorder (ASD) children suggested similar findings. Although research is minimal, results thus far support use of Yoga for therapists working with children with special needs.

Objective:

- (i) To study the effect of a twenty month non-residential yoga program in ASD children's behavior.
- (ii) To study the effect of a comprehensive non-residential yoga-based program on eye to eye gaze, sitting tolerance, body posture, body awareness, depth perception and balance, imitation, repetitive self- stimulatory and self-injurious behavior and receptive skills related to spatial relationships.

Design: Crossover randomized control study.

Setting: Non-residential special schools in Bangalore, South India.

Subjects: 42 children with established ASD were profiled ; 12 from four special schools satisfying the inclusion criteria were selected. 6 from School A, 5 males and one female formed the yoga group (experimental group). 2 from males from School B, 2 males from School C and 1 male and 1 female from School D formed the non-yoga group (control group). These subjects were recruited for the study.

Inclusion criteria included diagnosis of autism according to ICD-10 criteria, age 8-14 years initially, parents educational background minimum graduates, socio-economic background middle class. A semi-structured interview was used to obtain both demographic and vital clinical data, including personal, family and ASD behavior history. The study was approved by both SVYASA's review board and ethical committee. Signed informed consent was obtained from all the parents of the subjects. Twenty-month's yoga intervention for five days weekly, one hour a day was implemented with the yoga group. Subjects in the yoga group received regular Applied Behavior Analysis (ABA) based intervention program in the regular class room. All the subjects were in pre-nursery training program. Subjects in the non-yoga group received only ABA based intervention program in the special schools.

All the parents in both yoga and non-yoga group were interviewed using standardized E-2 autism checklist and recorded. The researcher trained eight special educators (2 from each school) to observe different behavioral parameters. The behavior was graded by using a rating scale.

Intervention: The intervention consisted of a twenty month- intensive day school yoga program comprising of *warmup practices, loosening practices, strengthening asanas, calming asanas, yoga breathing practices and chanting*. Parents of yoga group children practiced meditation, dhyana and also attended counseling sessions.

Outcome Measures:

- (i) ASD behavior was assessed using E-2 autism checklist, questionnaire based on parents' interview, modified test of Repetitive Stereotyped Behavior Test Battery (RSBTB) and Imitation Test Battery (ITB).
- (ii) Base-line data was collected during the first twelve sessions, mid session data collected between 200 and 202 sessions and post data collected between 389 and 391 sessions.
- (iii) Data were analyzed by drawing a column graph taking the average value of observers.

Results: Results are presented in three parts: first, baseline characteristics; second, impact on ASD symptoms and perceived child outcomes; third, effects on a wide range of behaviors, nonverbal skills, social interaction, imitation, and repetitive stereotyped behaviors (RSB). Despite small sample size, consistency across tests and subjects make the results significant

Behavior characteristics addressed in the research were significant to parents and staff. Parents find lack of eye contact, hyperactivity, and resistance to change difficult to endure; staff emphasize those impacting learning negatively: lack of eye contact to gain attention, lack of imitation skills, poor sitting tolerance, and temper tantrums.

Behaviors manifesting during Yoga and in class were consistent with baseline reports of parents and staff. After the first 12 sessions, no observable changes in eye-to-eye gaze, sitting tolerance or imitation skills occurred. Thereafter, subtle changes in behavior were recorded by observers and parents. Children initially unaware of their breath gradually learned to breathe in and out, and to deepen their breathing. Hand held mirrors, blowing toy materials, candles, soap bubbles, straw to drink water, etc. were used at this stage. Noticeable changes to slower and quieter breathing patterns were observed in the last few sessions.

By mid-session assessments, observed behavioral changes included eye-to-eye gaze (focus retained on objects: lighted candle, focus circle, color mat); sitting tolerance; and body posture. Improvements were noted in receptive skills to verbal commands concerning spatial relationship during *trikonasana* (triangle position) and *uttanasana*; imitation skills; self-stimulatory activity; and self-injurious behaviors. Teachers reported increased alertness after sessions.

During the post-assessment, children previously unable to connect with the therapist started coming closer during continuous chanting of mantras; they seemed to enjoy chants as they encouraged a sense of rhythm and a means to work on coordination. Slow mantra chanting witnessed appreciable increases in oral-facial movement imitation skills. Children who initially sat outside the mat, or span or jumped

on the mat, demonstrated discipline by sitting in *vajrasana* when gentle touch was applied on their lower back. Significant changes occurred in communication, language, play, and joint attention. Patterns of eye contact steadily improved, e.g., focusing on the therapist's counts by drumbeat. Over the intervention, children started to trust, share, initiate, and reciprocate. By the 372nd session, all children showed increased vocal imitation skills by imitating vowels "a, e, i o, u" and "OM." They greeted the therapist with a smile, vocalizing "namaste." Parents reported improvement in ability to interact with other children and family members.

Conclusion: A long-term intensive school based yoga-program improves ASD behaviors such as eye to eye gaze, sitting tolerance, body posture, body awareness, depth perception and balance, imitation, repetitive self- stimulatory and self-injurious behavior and receptive skills related to spatial relationships. Yoga therapy may offer families an effective management tool for family-oriented treatment of childhood ASD.