EFFECTS OF YOGIC PRACTICES AND PHYSICAL ACTIVITIES ON CHILDREN WITH AUTISM SPECTRUM DISORDERS

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1. Introduction

Autism Spectrum Disorder (ASD) is generally defined as a common and complex neurodevelopmental disorder. It usually manifests in children in the first three years of age. The core symptoms are impaired social behaviors, difficulties in communication and interaction, restricted interests, repetitive and stereotyped behaviors. ASD distresses millions of children worldwide with a high rate of prevalence. The last few decades have witnessed a dramatic global increase in prevalence and awareness of ASD. In India, the prevalence rate is increasing drastically. Over the years, several concepts have developed with various perceptions of comprehending ASD. Autism may be caused due to environmental acquaintance or genetically inherited disorders; however, no conclusive or universally habitual reasons are known for ASD. This makes the issue equally challenging and demanding. The quest for etiologic factors of ASD is wide-ranging and there is not yet any established universally effective one. Recently, yoga and physical activities are gaining popularity for people with ASD as a Complementary and Alternative Medicine (CAM). Yoga is the ancient holistic wisdom of India. It is a practical, methodical and systematic discipline for unfolding the unlimited potentialities of humankind. Physical activity (PA) is any bodily activity by skeletal muscles that enhances or maintains physical fitness and overall health and wellness. Several study outcomes showed positive indications of using yoga and physical activity intervention for healing and managing ASD and other disabilities. But the literature on ASD is insufficient and limited, so further comprehensive research is needed. For the current study, the problem was stated as “Effects of yogic practices and physical activities on children with autism spectrum disorders”.

2. Objectives of the study

The objective of the study was to investigate and analyze the effectiveness of six-months non-residential structured yoga and physical activity intervention program on Problem behavior patterns of participants with autism spectrum disorders (ASD).

3. Methods and Materials

3.1. Participants

Depending upon understandability of the children/adolescents, the motivation, interest and availability of the parents, 24 children already diagnosed from Pradip Center for Autism Management, Kolkata, West Bengal, India, were selected as samples for this study. The diagnosis

of autism spectrum disorders (ASD) was confirmed by using the Indian Scale for Assessment of Autism (ISAA). The children with moderate levels of ASD were selected as a sample for this study. The inclusion criteria included diagnosis of autism according to the Indian Scale for Assessment of Autism (ISAA), age ranging from 8 to 14 years initially and participants with average physical health participating in yoga and physical exercise program. Children must have at least one year of special school education experience are selected as a sample for the study.

3.2. Design of the study

A randomized controlled pre-post experimental design with a control group was employed for this study. Two experimental groups; A. yoga group and B. Physical activity group attended the yoga and physical activity intervention for three (3) alternative days a week for six months. The control group did not participate in either yoga or physical activity interventions, they continued their assigned special schools' activities. The data were collected from two experimental groups and one control group three times; pre-test (before beginning of yoga and PA intervention), mid or intermediate test (after three months) and post-test (after six months).

3.3. Interventions

3.3.1. Yoga intervention

In this study, non-residential structured yoga intervention program was implemented for six months by qualitative and certified yoga teachers. The structured yoga modules followed a sequence of 7 components- 1. Prayer, 2. Loosening exercises (Standing, sitting & dynamic), 3. Asanas/Postures (Standing, sitting, supine & prone), 4. Pranayama/Breathing exercise, 5. Relaxation, 6. Chanting and 7. Closing prayer.

3.3.2. Physical activity intervention

In this study, another intervention program for participants with ASD was physical activity (PA). The structured PA was implemented for six months. Each PA session included four phases; A. Preparatory phase, B. Specific activity phase, C. Minor game phase and D. Cooling down phase. All selected participants attended yoga and PA sessions regularly and positively.

3.4. Assessments

In this study, 15 problem behavior parameters were assessed; 1. Auditory, 2. Tactile, 3. Gustatory-Olfactory-Elimination, 4. Social, 5. Temper tantrums, 6. Physical harm toward others, 7. Odd Behavior, 8. Self-injurious behaviors, 9. Unusual fears, 10. Disobedience, 11. Repetitive

behavior, 12 Speech, 13. Vestibular, 14. Inattentiveness and restlessness and 15. Odd sexual behavior. The assessment was conducted with Problem Behavior Checklist, Banerjee et al., 2013. Three assessors for the study were parent of ASD participants, teachers of special schools and psychiatrists.

3.5. Statistical analysis

For analysis the collected data Arithmetic Mean (M), Standard Deviation (SD), Shapiro-Wilk Test for Normality, Levenes Test for Homogeneity, Multivariate Analysis of Covariance (MANCOVA) to compare the mean difference of different test results (Pre-Mid and Post-test) among the groups and Bonferroni post-hoc test for pairwise comparison between the groups were applied. The significance level was at 0.05. All the statistical analysis was carried out using SPSS. 20 version and Microsoft Excel.

4. Results

The results of the study showed six months of regular yoga and physical activity training in a special school environment significantly decreased problem behaviors of participants with moderate level of ASD. In the yoga group, there was significant reduction in problem behaviors parameters (Self-injurious PB, Repetitive PB and Inattentiveness PB) in the mid-test (after three months) followed further by a significant reduction in most of the PB parameters (Auditory PB, Tactile PB, Social PB, Self-injurious PB, Unusual fear PB, Disobedience PB, Repetitive PB, Inattentiveness PB and Total problem behaviors) by the end of yoga intervention in the post-test (after six months).

For the physical activity group, there was also significant reduction in PB parameters (Self-injurious PB, Unusual fear PB, Inattentiveness PB and Total problem behavior) in mid-session (after three months) followed further by a significant reduction in most of the PB parameters (Auditory PB, Social PB, Self-injurious PB, Unusual fear PB, Disobedience PB, Repetitive PB, Inattentiveness PB and total problem behaviors) of participant with moderate level of ASD, at the end of physical activity intervention in post-test (after six months).

In the control group no significant improvement in different PB were seen. Yoga and physical activity intervention are both effective tools for the holistic management of problem behaviors, overall health and well-being of children with moderate level of ASD. There were no significant changes in any of the problem behaviors parameters in the control group.

5. Discussions

The aim of the current study was to study the efficacy of six months non-residential structured yoga and PA training program in treating different problem behaviors of participants with a moderate level of ASD. Most studies have addressed problem behaviors, considered one of the significant challenges associated with children with ASD. The investigator selected 15 problem behavior variables selected for this study (Banerjee et al., 2013).

The final result on PB, reported by parents, class teachers and clinical psychiatrists, reveals that regular structured yoga and physical activity (PA) training is significantly effective in decreasing PB of participants with moderate levels of ASD. After three months (in intermediate test) of regular yoga and PA training interventions, significant differences among the subjects' groups (Yoga, PA & Control) were found. And after six months (in post-test) of training, the same trend was followed and statistically significant differences between the groups were noticed.

The problem behaviors or challenge behaviors are some serious issues for ASD. In the current study, children with moderate levels of ASD were selected as a targeted sample group and the findings of the study suggested that yoga is effective for reducing and managing problem behaviors in special school environment. Earlier, Narasingharao et al., 2017 studied ASD individual and found almost the same results. From the reports of parents, class teachers of school and clinical psychiatrists, it was seen that yoga has significantly decreased PB in home, school and other environments. The possible reason may be that yoga provides a calm, noiseless and therapeutic environment, which encourages internal calmness in the senses and builds a hassle-free internal stability in the thought process (Rosenblatt et al., 2011). Various studies have shown that yoga induced relaxation response, sound sleep, coordinated motor proficiency, awareness (gross & subtle), calmness, behavioral confidence, better group tolerance, better emotional expressivity and better response to instructions (Radhakrishna et al., 2010; Koeing et al., 2012). Yoga also provides better comfort in different social settings, improves relaxation time (Radhakrishna et al., 2010), reduces sedentary behavior and significantly helps to manage hyperactivity, develops better control over own body and mind (Litchke et al., 2018). All these developments may bring a reduction in the PB of ASD children. All this positive development in participants contributes a lot to improving brain functions, addressing frontal lobe deficits for optimal state of calmness, cooperations and voluntary response in children with ASD (Ramanathan et al., 2019).

Another possible reason may be that yoga improves the quality of life, but it takes time to reshape the whole physical, physiological and psychological structure of an individual. It is also a proved and established fact that yoga may increase in parasympathetic activity reflected by the vagal nerve (Artchoudane et al., 2019). And ASD is a complex neurodevelopmental abnormality started in the womb, so it may need more long-term intervention (Narasingharao et al., 2017).

From these findings it may be assumed that a regular yoga and physical activity (PA) training program may have almost the same significant positive effect on lessening of PB in participants with moderate levels of ASD. And the result indicates long-term intervention may produce better results.

6. Conclusions

The current study showed that after three months of a regular non-residential structured yoga program in special school contributed to a significant reduction in problem behaviors, such as Self-injurious PB, Repetitive PB and Inattentiveness PB in children with moderate levels of ASD.

The study also found that after six months of regular non-residential structured yoga program in special school contributed to a significant reduction in problem behaviors; such as Auditory PB, Tactile PB, Social PB, Self-injurious PB, Unusual fear PB, Disobedience PB, Repetitive PB, Inattentiveness PB and Total problem behaviors of children with moderate level of ASD.

After three months of a regular non-residential structured physical activity (PA) program in special school contributed to a significant reduction in problem behaviors, such as Self-injurious PB, Unusual fear PB, Inattentiveness PB and Total problem behavior of children with moderate level of ASD.

Other findings of the study were that after six months of regular non-residential structured physical activity program in special school contributed to a significant reduction in problem behaviors; such as Auditory PB, Social PB, Self-injurious PB, Unusual fear PB, Disobedience PB, Repetitive PB, Inattentiveness PB and total problem behaviors of children with moderate level of ASD.

The current study also revealed that regular yoga and physical exercises are both equally highly effective for reducing and the management of different problem behaviors of children with moderate level of ASD.

7. Application of the study

The study showed the path that the structured short modules of yoga and physical activity program applied in this study can be easily incorporated into the busy time schedule of a special school. The yoga and PA modules were very compact for a special school and consisted of a mix of repetitive and new innovative practices that supported the needs and preferences of the children with a moderate level of ASD. The training modules used in the study were very fit for a small space of a special school and with a minimum requirement of equipment. The yoga and PA practices include simple practices that children at various levels of functioning can perform. Consistent and regular implementation of these yoga and PA modules can decrease parental support for different activity of children with levels of ASD. The special schools can integrate regular yoga and PA programs as a reachable practice for children with ASD, to improve their overall health and well-being. The study findings would be helpful to special education teachers, physical education & yoga practitioners and caregivers of children with ASD. A regular participation in yoga and PA training can regulate problem behaviors, permitting children to be better involved in classroom activities.

8. Strength of the study

The current study was a unique one, as the participating target group for this study was the moderate level of children with ASD (diagnosed with ISAA) and showed their high level of participation and performance response in yoga and PA training program. Furthermore, to the best of the investigator's knowledge, there was little or no yoga and PA research work on moderate level children with ASD being conducted. This was possibly the first one in West Bengal and in the Eastern region of India. The study applied intervention for six months with a control group. Another strength of the study was that a short and compact, incorporated daily yoga and PA module was developed for a special school. From the literature context, very little study on yoga and PA on problem behaviors and the moderate level of ASD children were conducted, so the study will contribute to empowering limited existing literature. The study also collected data on problem behavior response from ASD participants by parents, school teachers' and clinical psychologists, which was also a unique and innovative approach used in this study to collect exact

responses. The mid-point data was also taken. The yoga and PA modules used in this study may provide comprehensive knowledge for the formation of yoga and PA teachers' training curriculum to teach yoga and PA to children with different levels of ASD.

9. Limitations of the study

The result of the study showed a significant positive impact of yoga and PA program on reduction of problem behaviors of children with moderate levels of ASD. Despite the positive results, there are certain issues to consider. The small sample size was a limitation for this study. Participants' individual differences or uniqueness (such as IQ, adaptation ability), variation in yoga and PA sessions attended, and the duration of interventions was short. The knowledge, understanding and perception ability of assessors (parents, school teachers and clinical psychologists) was different about ASD and problem behaviors. The pre-mid-post-test assessments were done by different teachers and psychologists. If it was the same, then the result would have been more accurate and understandable. No data was collected on the effect of the interventions on their functional and academic assessment in special schools. Assessment procedure of problem behaviors were by subjective, objective assessments may produce more accurate and reliable outcomes. A wide range of responses to yoga and PA interventions were observed.