

## 7. DISCUSSIONS

The present study was conducted to study effects of yoga practices on health-related physical fitness and psycho-motor abilities among intellectually disabled children. As there was no standard it available for intellectually disabled children, the investigator developed a yoga module in consultation with experts in yoga. An attempt was made to develop a yoga module for children with intellectual disability by selecting specific yoga practices on the basis of traditional literature and scientific studies on yoga. The yoga module was validated by experts in yoga and was modified in the light of their suggestions. Similarly, an effort was made to retain only those practices which were rated by all the experts as useful. The sequence of the yoga practices was retained as per the suggestions given by the experts. Many experts were of the opinion that practices should be easy for children with intellectual disability. Further, the experts suggested including a few loosening exercises. The matching of yoga practices with symptoms of children with intellectual disability was performed after reviewing the traditional literature (Saraswati & Saraswati, 1998; Digambarji & Gharote, 1978; Brahmachari, 1965). The present study is closely associated with earlier studies on the validation of a yoga module (Isha, Deshpande, Ganpat & Nagendra, 2015; Kakade, Metri, Varambally, Nagaratna & Nagendra, 2017; Bhat, Varambally, Karmani, Govindaraj & Gangadhar, 2016; Govindaraj, Varambally, Sharma & Gangadhar, 2016; Patil et al., 2015; Naveen et al., 2013; Hariprasad et al., 2013; Ram et al., 2012; Mohanty, Hankey, Pradhan & Ranjita, 2016). Moreover, to validate the yoga module, a pilot study was conducted on thirteen intellectually disabled children and the results were encouraging wherein improvement in flexibility, strength of abdominal muscles and static balance were observed. In a nutshell, a yoga module for children with

intellectual disability was designed based on the traditional texts and was validated with the help of experts. The developed yoga module was applied for the main experiment.

The results of the twelve-week work indicated that the yoga module was effective in improving health related physical fitness level of the intellectually disabled children. Earlier studies have indicated that individuals with intellectual disabilities score lower on standardized tests of physical fitness during all the phases of their life than individuals without intellectual disability (Chanias et. al., 1998). For this reason, individuals who are intellectually disabled are often unable to adequately perform everyday activities and are limited in their work-related duties (Fernhall & Pitetti, 2001). Individuals with intellectual disability exhibit lower levels of cardiovascular fitness than their non-disabled peers (Gillespie, 2003). The results of this study showed improvement in cardiovascular efficiency of intellectually disabled children after practice of three-month yoga training. Previous research studies also showed a significant improvement in cardiovascular endurance of young subjects who were given varying periods of yoga training (months to years) and compared to a similar group who performed other types of exercise (Bera & Rajapurkar, 2003; Pansare et al., 1989; Raju et al., 1986; Ray et al., 2001; Tran et al., 2001).

The experiments also revealed a significant improvement in flexibility, strength of abdominal muscles and body fat percentage. Similar results were observed in several studies wherein yoga practices were given for improving health related fitness in varied population (Polsgrove, Eggleston & Lockyer, 2016; Petric, Vauhnik & Jakovljevic, 2014; Cowen, 2010; Goncalves, Vale, Barata, Varejao & Dantas, 2010; Amin & Goodman, 2014; Purohit, Pradhan & Nagendra, 2016). The results of the present study

are in line with the previous investigations showing a significant improvement in health-related physical fitness of intellectually disabled children. In fact, yoga intervention for a period of 3 months helped to improve almost all the attributes of health-related physical fitness. The appearance of such result may be due to the fact that yoga has some ingredients like *asanas pranayamas bandhas and kriyas* which generally give a gentle massage to the inner muscles and cleans their impurities. Regular practice of such yogic exercises might have helped to improve the overall performance of the muscles and joints and therefore results into the enhanced level of health-related physical fitness. ***Therefore, hypothesis H<sub>1</sub>: “The yoga training intervention will contribute to improve physical fitness of intellectual disability children” is accepted.***

Furthermore, the results of the present investigation revealed a significant improvement in psycho-motor performance of intellectually disabled children after the practice of twelve weeks of yoga.

The research reports indicated that individuals with intellectual disabilities scored lower on reaction time than the individuals without intellectual disability (Un & Erbahceci, 2001; Baumeister, Hawkins & Kellas, 1965; Brewer & Nettelbeck, 1977). Further, children with intellectual disability had significantly more borderline and definite motor problems than the normative sample and there was an association between the degree of intellectual disability and performance of manual dexterity, ball skills and balance skills (Vuijk, Hartman, Scherder & Visscher, 2010). For this reason, individuals who are intellectually disabled were often unable to adequately perform everyday activities and were limited in their work-related duties (Fernhall & Pitetti, 2001). The results of this study showed an improvement in motor skills such as

reaction time, eye-hand co-ordination, static balance and agility after three months of yoga training. In fact, yoga for children is a relaxation technique that has been found to reduce stress, dissipate excess energy, relieve tiredness, lengthen attention span, improve physical health, sharpen concentration, enhance mental clarity, and cultivate better interpersonal relationships (Seiler & Renshaw, 1978; Peck, Kehle, Bray & Theodore, 2005). Yoga is a complete science which makes the body healthy and provides mental peace leading to spirituality. It is very useful for disabled children as they can get relief from physical ailments (Ijbarathi, 2012), improve IQ, concentration, attention span (Uma, Nagendra, Nagarathna, Vaidehi & Seethalakshmi, 1989) & psycho-motor performance (Purohit, Pradhan & Nagendra, 2015). The findings of the present study are supported by earlier research reports. The yoga training for a period of three months helped to improve the selected motor function tests. The appearance of such results may be due to the fact that in general yoga practices are performed slowly and gradually, in a closed kinetic chain. The practices include isometric muscle contractions and active stretching which enhance concentration. This might have helped to improve muscle strength, enhance joint mobility and improve body posture. ***Therefore, hypothesis H<sub>2</sub>: The stimulus of yoga training will be significantly effective in improving psycho-motor performance of intellectually disabled children” is accepted.***

To summarize, the results of this study proved, beyond doubt, that yoga module as developed in this study is reliable and valid for the intellectually disabled children. Moreover, the regular practice of yoga for sixty minutes daily in the morning for a total period of twelve weeks is beneficial in improving health related physical fitness and psycho-motor performance among the children with intellectual disability.