



Dance and Down Syndrome – Holistic approach

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Abstract- Down Syndrome is the most common neurodevelopment disorder that is chromosome related. These individuals face delay in general development, motor function, language and cognitive. This is the most common genetic condition, resulting in psychological, physical and social impairments. Benefits of Dance for individuals with Down syndrome has many benefits; however, there is limited research on this topic. Dance and movement immensely help these individuals. The purpose of this paper is to describe how Bharatanatyam can be considered in a holistic approach to help individuals with Down Syndrome. Common characteristics of individuals with down syndrome are analysed and difficulties in relation to brain functionality, memory, cognitive issues are considered when framing the holistic program.

Index Terms- Down Syndrome, Bharatanatyam. Holistic

Introduction

Down syndrome (DS) is the most common neurodevelopmental disorder which is caused by an extra chromosome. These are comparatively common with incidents of between 1:750 and 1:1000 live births (Karmiloff-Smith et al. 2016). It is also the first genetic disorder attributed to a chromosomal abnormality that is characterized by intellectual ability (Pinkham and Lewis 2005). Kids with DS face neurodevelopmental issues such as cognitive, gross motor, fine motor, receptive language, expressive language etc. (Farias and Teixeira-Machado 2016). Regardless of limitations, physical activity is still important for individuals with DS, and a set of guidelines should be followed when programming physical activity or exercise. As many individuals with DS experience both cognitive and developmental difficulties, dance will provide balance, strength and flexibility. Dance therapy uses psychotherapeutic movement to support the cognitive, emotional, physical, and social integration of a person (Strassel et al. 2011). Dance therapy in general has grown in past years and research work related to providing physical and emotional strength has a community satisfaction. Dance in general gives inner strength, happiness and confidence and this research is to work with kids with Down syndrome to help use Bharatanatyam as a channel. Studying the nature of physical and emotional aspects that can give strength to Down syndrome kids and to analyse how Bharatanatyam can facilitate will be the basis of this research. This

thesis also addresses strategies in teaching essential life and communication skills to children with Down syndrome and how to choreograph to help them learn skills in effective way. Physical and intellectual limitations were studied to describe emotional and behavioural findings and based on strengths and weaknesses how aspects of Bharatanatyam can help is the core area of interest in this thesis.

Health and development issues

Individuals with Down Syndrome face many medical conditions such as, learning difficulties, cardiovascular problems, endocrine problems such as thyroid, diabetes, obesity, vision and hearing issues, low muscle tone, hearing, and Vision loss. Common symptoms of Down Syndrome vary from person to persons and in different range. Physical symptoms include (Bull and the Committee on Genetics 2011) decreased or poor muscle tone, short neck, small hands, small head, ears and mouth, flattened facial muscles and nose, eyes slanting upwards, and extra space between first and second toes. Because of poor muscle tone, a child with down syndrome may be slow to turn over, sit, stand, and walk. Though the kids with down syndrome take longer to achieve these milestones, they are able to successfully manage them. These kids also have cognitive impairment and delay in thinking and learning. Behavioural patterns such as logic and reasoning, short attention, memory, perception, processing, delayed language, and speech development. These individuals with Down syndrome face issues in linguistic areas including vocabulary acquisition and with their problems in verbal short term memory they also struggle in verbal communication (Jarrold and Baddeley 2001).

Individuals with DS have multiple medical conditions and cognitive impairment (Bull and the Committee on Genetics 2011). With MRI studies done, size of the brain cerebellum, hippocampus, and cortex is significantly smaller when compared to typically developed individuals. (Karmiloff-Smith et al. 2016). Based on extensive studies cognitive impairment such as thinking, and learning have been identified as a common issue. This has led to delay in learning and speaking. Due to the brain structure self-motivation has been identified as a major deficit. When compared to typically developed kids visuospatial processing skills has been seen as relatively preserved in individuals with Down Syndrome.

Program - Focus areas

A program is designed to help kids with Down Syndrome using basic components of Bharatanatyam help live their daily life activities. This program focuses mainly on four different aspects

- **Improving strength.** Providing a program that focuses on combination and different variety of exercises to increase strength not just physical but emotional is essential. These activities that are designed in a fun way with games that improve fitness and cognitive functions. This program is modified to suit the growth of the child.

- **Improving Cognitive skills.** Focusing on a framework and program that will help in learning to master motor skills which in turn will help leading better life skills. This helps living and functioning with daily activities independently.
- **Improving balance, coordination, and postural control.** This framework also outlines many techniques to help with posture. There are different exercises and movements that enhance skills in coordination and balance. Other skills such as jumping and skipping are incorporated into a fun exercise.
- **Improving physical fitness.** These movements help determine the specific exercises, focusing on improving physical fitness. Exercises to improve strength in knees, ankle, shoulder, etc are also designed.

Based on the above focus areas issues seen in kids with down syndrome were studied as stage 1. Further to understanding the difficulties faced, 8 different goals were identified. These goals help to improve developmental delay in cognitive, motor, personal and social skills.

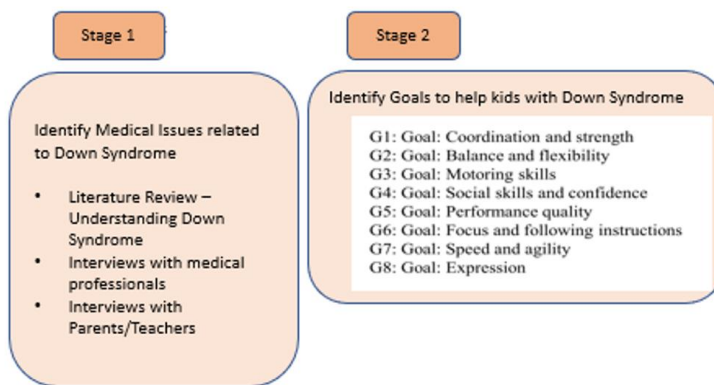


Figure 1: Stages to identify issues and goals

Below table lists issues and difficulties faced by kids with Down Syndrome. Based on references listed below, they are matched on how the goals can be achieved.

Issues	Difficulties	References	Goals
Hypotonia (low muscle tone)	Delay in gross motor skills Delay in fine motor skills	(Albin 2016), (Connolly et al. 1993), (Swinford 2012), (Bull and the Committee on Genetics 2011), (Michigan 1960), (Gutiérrez-Vilahué et al. 2016), (Van Gamen-Oosterom et al. 2012), (Vicari 2006), (Funk n.d.)	G1
Postural stability	Movement and balance Body coordination in dynamic position changes	Cardoso et al., 2015), (Biederman and Freedman 2007), (Connolly et al. 1993; McGuire et al. 2019), (Fertier 2014; Morris, Baldeon, and Scheuneman 2015), (Bläsing et al. 2012; Burzynska et al. 2017; Cardoso et al. 2015; Funk n.d.; Gutiérrez-Vilahué et al. 2016; Michigan 1960; Morais et al. 2016; Morris et al. 2015; Vicari 2006)	G1
Impaired	Slow to develop movement	(Anderson et al. 2013; Bläsing et al. 2012; Burzynska et al. 2017;	G5, G7

Neurological development	skills, Body awareness and space awareness	Cruz 2016; Dunphy, K., Lebre, P., & Mullane, S. 2020; Farias and Teixeira-Machado 2016; Fertier 2014, 2014; Gardiner 2014; Myśliwiec et al. 2015; Natyalayam n.d.; Pinkham and Lewis 2005, 2005; Reinders, Bryden, and Fletcher 2015; Van Gamen-Oosterom et al. 2012; Yam et al. 2008)	
Cerebellum is smaller and less dense	Balance, motor control and motor learning disorders	(Anderson et al. 2013; Burzynska et al. 2017; Connolly et al. 1993; Gardiner 2014; Karmiloff-Smith et al. 2016; Reinders et al. 2015; Vicari 2006)	G2, G3
Corpus Callosum is thinner	Disrupted efficiency of bimanual movement	(Burzynska et al. 2017; Reinders et al. 2015; Vicari 2006)	G1, G2, G5
Smaller frontal lobe	Goal oriented functioning	(Anderson et al. 2013; Burzynska et al. 2017; Jarrold and Baddeley 2001; Karmiloff-Smith et al. 2016; Reinders et al. 2015; Vicari 2006)	G4, G5, G6
Facial muscles	Speaking clearly	(Dunphy, K., Lebre, P., & Mullane, S. 2020; Karmiloff-Smith et al. 2016; Michigan 1960; Pinkham and Lewis 2005; Vicari 2006)	G8

Table 1: Issues and references

These goals are the foundation to the program and the framework developed identified different aspects of Bharatanatyam to help achieve these goals. Dance has been seen as a therapy and leisure activity for several years. Bharatanatyam was specifically chosen to help kids with Down syndrome based on the following key aspects of Bharatanatyam: Postures and different foot positions, Movement to help strength, balance and coordination, Motor skills with mudras, Carriage and centre of gravity, Stamina and endurance, Agility and flexibility, Abhinaya (facial expression) to help with emotions, Emotional aspects such as concentration and stress and relaxation. All areas of child's development are interconnected and impact on each other. Specifically, with children with Down syndrome who have many health issues essential health and well-being will always take precedence over their development. If these essential needs are not being met, this may have an impact on their survival. A child's personality, and the physical and social environment also make a difference. As each child has different strengths and talents, this can be built upon and utilized to assist in developing their independence and self-identity.

Based on the aspects of Bharatanatyam, following list was categorized to plan the program to help kids with Down Syndrome.

Stage 3 Categorise how Bharatanatyam can help		
	Difficulties	How BN helps
Angika	Fine motor skills	Mudras
		Movement
		Facial expression
	Gross motor skills	Movement
		Expression
	Strength	Foot positions
		Jumps
		Spins
		Half and full sit positions
	Speed and Agility	Body awareness
	Movement	
	Space awareness	
Postural stability	Balance	
	Sun salutations	
Coordination	<u>Adavus</u>	
Facial Muscles	Facial expressions	
Vachika	Speech	Slokas
		Jathis
	Motoring skills	Use of thatukali, nattuvangam
		Music
	Timing	
Aaharya	Coordination	Using props (sticks/lights for coordination)
	Confidence	Costumes, jewellery
Satvika	Emotional	Abhinaya
	Social	

Figure 2: Stage to reflect how Bharatanatyam can help achieve goals

Methodology for data collection

Based on health issues identified by the medical practitioners the list of improvements that dance can help was discussed with medical professionals and physiotherapists. Further, qualitative study was conducted with methods such as observation and interviews. Evidence based case study was also conducted to get in-depth understanding. This study was conducted using Qualitative methodology so that a range of perspective of different participants can be gathered and the context and deeper understanding of the issues can be identified.

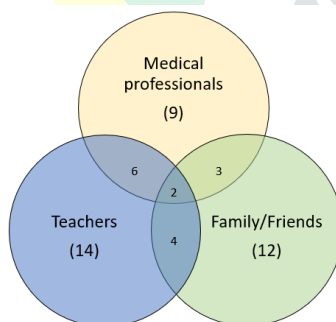


Figure 3: Data collection statistics

Study was conducted with other teachers such as drama teacher, horse riding teacher, and others to get different aspects and views in different environments. Physiotherapists, doctors and occupational therapists were consulted. Family and friends were also interviewed to get feedback based on social setting and day-to-day life activities.

Results and Discussion

Many recent research studies have shown the benefits of Bharatanatyam and they play a great impacts in areas such as coordination, balance, focus and expression (Sparsha shenoy, Dr.k.kumar 2019). When deciding on goals or focus areas for a child to work towards improving, it was made sure it is achievable and challenging. List below was identified with discussion with many Bharatanatyam teachers from different ages, skills and physical locations. A compiled list shows benefits and are that can be focused to help individuals with Down Syndrome.

Focus Areas	Goals / outcomes of Bharatanatyam	Goals to help DS
Dance foundations	Coordination	G1
	Strength and endurance	G1
	Posture and alignment	G1
	Flexibility	G2
	Motor skills	G3
	Spatial awareness	G1/G2
	Rhythm	G5/G7
	Musicality	G5
	Agility	G7
	Expression	G8
Performance	Social Interactions	G5
	Presentation	G5
	Creativity	G5/G8
	Stamina	G5/G1
	Time, space and energy	G5
Personal areas	Respect space around	G4
	Respect teachers	G4
	Commitment and dedication	G4/G5
	Respect difference in students	G4
	Learn to accept feedback	G6
	Self-care strategies (Coping with stress)	G4
	Able to face exams and performances	G4/G5
	Independence and decision making	G4/G6
	Focus and Following Instructions	G6

Table 2: Focus areas and goals to overcome issues

Conclusion

With children with Down syndrome, movement-based therapy on a regular practice session provide improvement. In addition to getting better at technique such as balance, coordination, strength, it also provides confidence to be in society. The many benefits of dance with better functionality to help daily activities can also stimulate cognitively to continue to lead a very fulfilling life. The creative aspects of dance are another area that provides inner satisfaction and happiness to the kinds with Down Syndrome. This program designed for kids with Down Syndrome is designed to a framework that fits in with developing social, emotional, physical and artistic growth. This program is not designed to substitute or replace physical therapy or other medical assistance, but to help with development in different areas in a supportive environment where all are treated equally. The outcome of focus on performance happiness with providing confidence to the dancers will help the

dancers with Down syndrome. Keeping issues faced by individuals with Down Syndrome, thinking in a different manner to inspire using classical choreography ideas based on Bharatanatyam will help and provide opportunity to develop better ways of leading their lives. Dance will also help these individuals to communicate through dance. This study helps to provide enjoyable physical activities, with improved cognitive skills and provide social and emotional experience.

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